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World Petroleum

THIRTY-FIFTH ANNUAL MEETING, AMERICAN PETROLEUM INSTITUTE

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WARM DAYS...
COLD NIGHTS...

TAKE A DAILY "PUNCH"

AT THE PEP IN YOUR MOTOR FUEL

ADDING WARREN NATURAL GASOLINE TO YOUR PRESENT HIGH QUALITY MOTOR FUEL WILL GIVE IT THE

RETAINED VOLATILITY

SO NECESSARY FOR SUPERIOR PERFORMANCE... IN ANY SEASON

Warren's production, transportation, storage and service are your assurance of the quality and quantity of NATURAL GASOLINE you need . . . when and where you want it.

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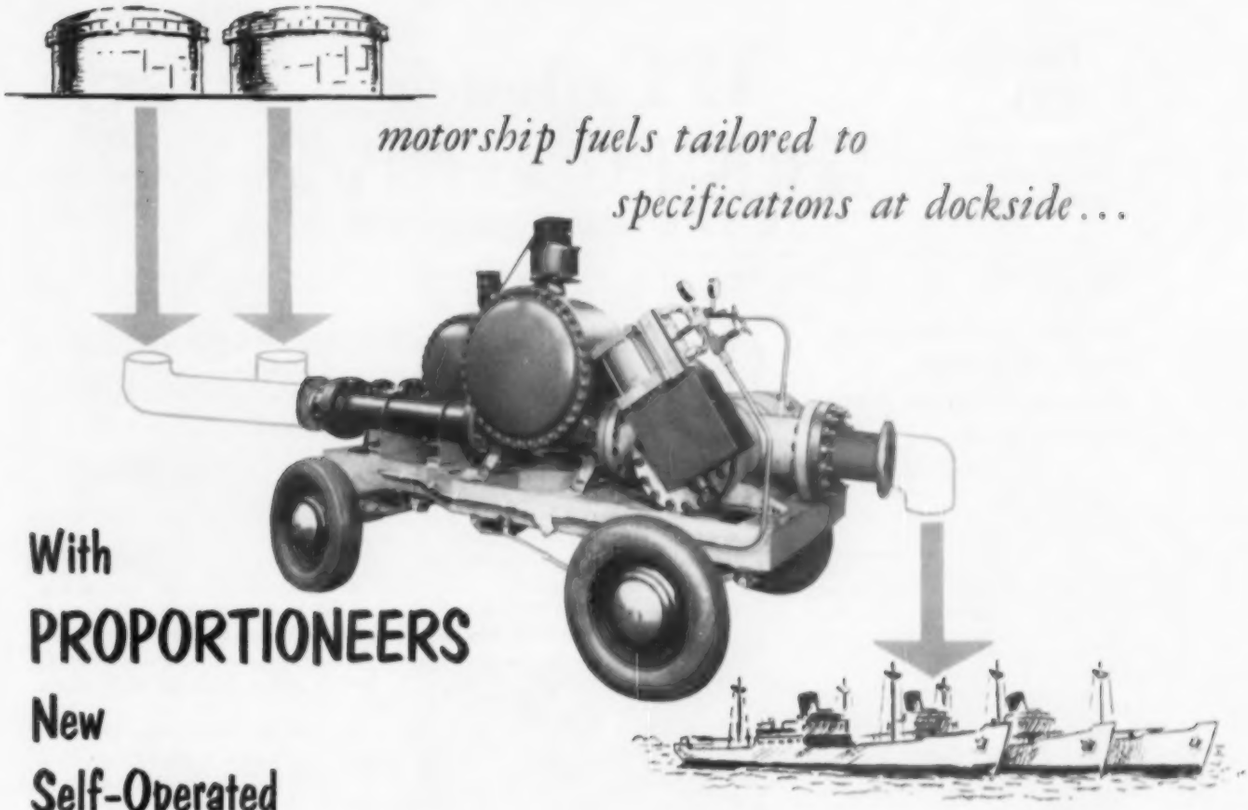

motorship fuels tailored to specifications at dockside...

With PROPORTIONEERS New Self-Operated Blender

Here is the positive answer to the problem of blending marine fuels to the exact viscosity ratings specified by ships' officers. Proportioneers self-operated fuel blender Type FB-2100 — requires only tankage for residual and distillate base stocks, ready for immediate blending to the individual ship's requirements. This mobile blender reduces costly multiple storage facilities . . . it eliminates the extra pumping from base stock storage to blend tanks . . . and it conserves valuable land area otherwise lost to tankage.

Is this system keyed to the needs of the industry? YES, it was developed specifically at the request of one of the world's largest petroleum companies. Will it perform accurately and dependably? Judge for yourself . . . let us send performance data for your own analysis. **PROPORTIONEERS, INC.,** (Division of B-I-F Industries, Inc.), 481 Harris Ave., Providence 1, Rhode Island.

advantages...

1. **Mobility** — for "on the spot" blending at dockside fueling stations. Also available for fixed installations.
2. **Maximum flexibility** — infinite adjustment from 90% residual fuel and 10% distillate to 50% residual and 50% distillate.
3. **Fail-safe operation** — if either stream fails the blender automatically cuts off the flow of fuel to the ship.
4. **Self-operated** — requires no external source of power as the blend valve is positioned by the pressure differential.
5. **Flow responsive** — automatically follows the demand for blended product while maintaining correct ratio.
6. **Simple installation and operation** — only connections necessary are to inlets and outlet of blender . . . single adjustment of variator provides desired blend ratio.
7. **Individual totalizers** — each stream has individual totalizer for inventory control.

B-I-F

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McCullough® REPORTS TO THE OIL INDUSTRY

Service
Anywhere Anytime

New Services • • • New Tools • • • New Methods • • • Outstanding Results

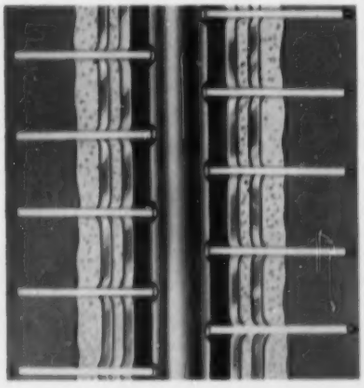
Uniform Hole Pattern in Casing Plus Deep Penetration Means More Barrels of Oil

Among the many benefits of M-3 Bullet Perforating is the uniformity of hole pattern in the casing. This perforating pattern is the same as the chambers in the gun itself. Shots are placed in patterns of staggered rows. This permits the safe use of more holes per foot in the casing, assures complete, uniform coverage of the productive zone, provides maximum drainage area from the formation and eliminates the possibility of bunching all shots in one area in the casing.

A fine example of effective perforating by M-3 Guns was recently reported from Wyoming.

Five inch O.D. 18 lb. liner had been set through the pay at 4300' and was perforated by another service company for 60 barrels of oil per day.

McCullough reperforated with 204 new ½" Burrless Ogival Bullets in three hours rig time. Well was put on the pump for 260 barrels per day—over a 300% increase in production—and has maintained this production after being on the pump for some time.



Improved McCullough M-3 Bullet Perforators fire one to six shots per foot, one to ninety at a time and are placed exactly where they are wanted. Uniform hole pattern plus deepest penetration assures more effective drainage of pay zone—More Oil!

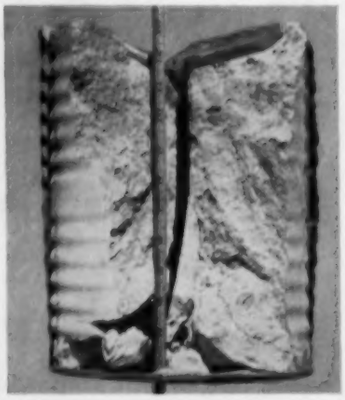
M-3 Bullet Guns Increase Production From 13,000 CF/D to 8 Million CF/D

Deep Penetration Through Thick Cement Sheath Increases Gas Production to 615 Times Previous Rate

The outstanding penetrating ability of improved McCullough M-3 Bullet Perforators was responsible for a startling increase in gas production from a Colorado well, according to a recent job report from the area.

Gas zone was located between 5349' and 5395'. Open hole, in the pay interval, was calipered at 13". 7" O.D. 23 lb. casing was set and cemented through the zone.

This zone had previously been perforated by another service company using the permanent type well completion method, and the well made 13,000 cu. ft. of gas per day.



7" O.D. 26 lb. N-80 casing set in cement and perforated by 4¼" O.D. McCullough M-3 Bullet Perforator. Test sample was standing on a steel plate and ½" Burrless Bullet penetrated entire depth of target and ⅜" into steel plate.

McCullough was called to re-shoot the same zone. Made five runs with improved McCullough 4⅛" 20-shot M-3 Guns and fired 184 ½" Burrless Bullets in the 46' gas zone. A considerable increase in gas pressure was recorded after each run. After perforating was completed, the well tested at 8 million cu. ft. of gas per day and has continued to be a good producer.

Penetration like this is not out of the ordinary. M-3 Guns firing the new ogival bullets are capable of penetrating as many as three strings of cemented casing and deep into the productive formation. They give you premium penetration at no extra cost—they get the kind of results you want—greater production with maximum economy.

M-3 GUN PENETRATES CEMENT LEFT BY FIVE SQUEEZE JOBS

Five and one-half inch 17 lb. casing had been set through pay at approximately 6386'. Well had been squeezed five times to obtain W.S.O., leaving a great deal of cement to be penetrated.

Two different makes of jet perforators were fired at the desired depth without results. An improved 4⅛" O.D. McCullough M-3 Bullet Gun fired four shots in the same interval and made a well of 125 barrels per day. Time on job: One hour.

McCullough® *TOOL COMPANY*

Cable Address: MACTOOL

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HOUSTON
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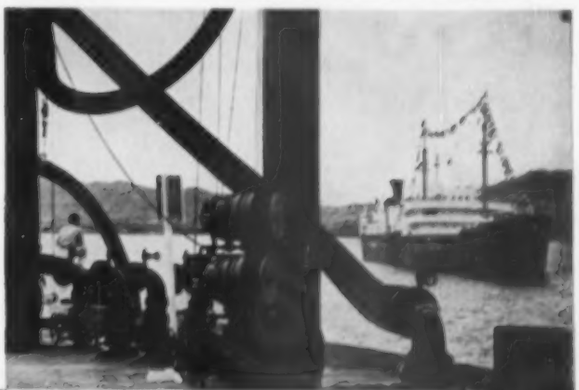
EGYPT — For more than half a century, the Nile's gigantic Asswan Dam has been the key point in Egypt's vast irrigation system. Now, engineers are installing a powerful hydroelectric plant in this dam. Cheap electricity from the plant will aid agriculture and heavy industry . . . will benefit all Egypt. Caltex lubricants and fuels are used for all construction equipment in this new project to harness the power of the Nile.

DENMARK — Motorists in and around Copenhagen — colorful capital of this gracious land — are familiar with spotless Caltex service stations. Here, as in 67 countries throughout the Eastern Hemisphere, the gleaming Caltex banjo sign stands for the finest automotive products, service that saves maintenance costs and the courtesy that every motorist has a right to expect.

CALTEX serves the people of 67 lands

PHILIPPINES — Gaily bedecked with pennants, the "s.s. Caltex Manila" stands by to deliver the first shipment of crude oil to the new Caltex Philippines refinery at Batangas. Officially opened in December, 1954, this modern refinery will provide work for many Filipinos and will help answer growing demands for petroleum products for agriculture, industry and automotive transport.

IN 67 lands, across half the world, through such developments as these, Caltex is able to supply better fuels and lubricants for industry, for agriculture, and for motoring millions. These require a continual investment of funds and skills, backed by a faith in a better future for free nations.



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Washington PIPE LINE

By Joseph B. Huttlinger

The subject of crude petroleum and product imports to the United States is headed for the attention of the U.S. Congress when the Congress returns to its sessions in January, since the Eisenhower administration seems unable to settle completely and finally on its own the complex and diverse factors involved in this pressing problem of international relations.

A large group of coal-state Congressmen and, to a lesser extent, of oil-state legislators is calling for speedy action to set a hard and fast quota ceiling on imports. An equally vociferous group of New England legislators is advising against any curbs whatsoever on oil imports. And a group of 27 Senators has promised to consider legislation unless the matter is settled by Jan. 1.

Since the middle of 1954, when the Congress enacted legislation in the Reciprocal Trade Agreements to deal with "excessive" imports, the subject has been receiving attention of top officials of the Eisenhower administration.

That legislation called upon the Director of Defense Mobilization to advise the President whenever he feels imports of any commodity are so high they hurt the domestic industry and thus national defense. If the President agrees, he is to make his own checkup, and then, if he sees the need, "take such action as he deems necessary" to lower the level of oil imports.

Dr. Arthur S. Flemming, Defense Mobilizer, has been gathering facts and figures on past, present and planned imports from all oil importing companies. A first glance at the figures, he said, indicates that imports are too high. This is the first time in years that a top official has said imports are too high, at least in such clear cut tones.

But, the question remained, what can the administration do about it? One group thought the antitrust laws should be waived so oil importers could sit around a table and agree about levels of oil imports. Both importers and the Department of Justice took a dim view of this. The idea of a voluntary agreement of oil importers was studied and abandoned.

The most that can be achieved, by the time Congress returns, is that the administration will have set up a machinery for studying oil imports, perhaps including public hearings. The chances are against the establishment of a hard and fast quota by the return of Congress. Without something more concrete there is certainty that the Congress once again will look into the matter.

Public hearings before Congressional committees may be held. Attention may be given to enacting a law to limit imports to 10 percent of domestic demand. The idea of Representative Frank Ikard (D., Texas) for an international proration on imports, may come in for attention.

At that, action to reduce imports drastically is by no means certain. The start of the winter sees imports at a high level, but demand up too. The price of residual fuel oil has been near its peak, indicating a strong demand for this heavy fuel oil. Further, the claims of a two million barrel daily shut in capacity in the U.S., are being widely discounted.

As things stand, a sort of moral suasion, is the chief influence upon oil importing companies to hold the line. That is, the companies want to please everyone, and thus are trying to do the right thing. Just what is the right thing, however, is the problem. That is do we bring in less oil, and please coal-state Congressmen? Or more, and please New England Congressmen?

The U.S. Congress will be looking at petroleum in other ways, too. House and Senate Small Business Committees say they will continue hearings into the problems of gasoline dealers. Danger in this is that some sort of new laws, even a new government agency, could result. Congressional tax studies are already probing oil's depletion allowance.

The National Petroleum Council, the chief oil body advising the government, is undergoing a grilling from Rep. Emmanuel Celler (D., N.Y.) of the House Judiciary Subcommittee on antitrust. The inquiry is spilling over into dollar a year men from industry who served the Petroleum Administration for Defense, the PAD and the Office of Oil and Gas, the Armed Services Petroleum Purchasing Agency, and the Military Petroleum Advisory Board.

The drive for passage of natural gas legislation, to remove or ease the new federal price controls over natural gas in the field, will provide the focus for new assaults upon oil and gas. The bill has cleared the House, and awaits action in the Senate. Chances are for passage, but mud will be thrown.

Fast Tax Writeoffs Near End

The American petroleum industry is near the end of the days of fast tax writeoffs—a government aid to spur on the expansion of vital defense industries such as oil and gas.

The five-year-old program remains in effect for some petroleum programs, notably alkylate facilities to use in making aviation gasoline. But the aid has been ended for crude oil and products and natural gas pipe lines, natural gas liquids, inland oil terminals and vessels, and oil storage facilities.

Dr. Arthur S. Flemming, Defense Mobilizer, said that the aid is being continued where the capacity is "inadequate to meet calculated full mobilization requirements" in the event of war. Conversely, cutting off the aid seems to infer a finding that the oil and gas industry has plenty of capacity for mobilization.

In addition to alkylate facilities, the aid is still available for ocean tankers, basic oil refining capacity, and special defense oil pipe lines. As for petroleum refining capacity, a new goal of up to nine million barrels daily capacity has been set, but applications for fast tax writeoffs up to that level are already in.

Dr. Flemming did not define special defense oil pipe line, but he recently held a public hearing into plans of two companies to lay products pipe lines from Beaumont, Texas, to Pittsburgh area.

One is Texas Eastern Transmission Co., Shreveport, La., which operates the wartime little inch and big inch crude oil lines for natural gas. The other company is the American Pipe Line Corp., New York. Both want not only fast tax writeoffs, but government guarantees of loans from banks. The U.S. has said more oil pipe line capacity to the East Coast is "imperative."

Another pipe line project, to lay a crude line from Midland, Texas, to the Los Angeles area, has been proposed by Lowell M. Glasco, Dallas, Texas, of Westcoast Pipe Line Co. This venture seeks a fast tax writeoff and a government guarantee of parts of a loan. The House Armed Services Subcommittee plans to resume hearings early next year.

With a fast tax writeoff certificate, a company may amortize part of the cost of an expansion in five years for income tax purposes; the normal amortization might be over 20 years. The majority of oil and gas expansion in the past five years of the program has been with tax certificates, although it never applied to crude oil production. The program has helped to obtain financing, but most of the expansion probably would have gone on anyway, oil comptrollers claim.

FTC Membership Changes Complete

The U.S. Federal Trade Commission, which did the spade work leading to the filing of the "international oil cartel" suit in 1953, now is completely changed, and has taken on the Eisenhower color.

Four of the five members are Eisenhower appointees. The fifth is Lowell B. Mason, a Republican from Illinois, whose term ends next September. Then, Mr. Eisenhower can name his fifth member.

Eisenhower appointees include:

John W. Gwynne, chairman, former Republican Congressman from Iowa, whose term ends in 1960.

Sigurd Anderson, Republican and former governor of South Dakota, whose term is until 1959.

Robert T. Secrest, former Democratic Congressman from Ohio, whose term expires 1961.

William C. Kern, Democrat of Indiana, up from the ranks of the FTC with powerful political connections; his term is until 1962.

With this many named by the present administration the blame or credit of the work of the FTC must go to the Republicans. The FTC enforces certain antitrust and other acts for the protection of small business and the public.

U. S. Road Expenditures

Nearly one dollar out of each 20 being spent annually by all units of government for all purposes in the U.S. goes for highways according to a new study by the U.S. Bureau of the Census. And the highway share is likely to climb further.

During 1954, total spending by cities, states and the federal government came to $99,498 million in direct outlays. This is about the same total as in past years. Of this the highway share goes like this:

1954—$5,586 million
1953— 5,053 million
1952— 4,714 million

On the order of 10 percent of the spending is for toll highways. Thus, last year, some $561 million of the total went for toll roads.

The states spend far more money for highways than any other level of government. The 1954 breakdown:

U.S. —$ 60 million
States — 3,254 million
Local — 2,272 million

And some of the local spending actually is reimbursed by the states. For instance, in 1954, some 34 percent of the local spending, or $871 million, was paid by the states' treasury.

On the income side, the states rake in the lion's share of all revenues from highway user taxes. Total motor fuel taxes brought in $3,063 million last year, and of this, $2,218 million is the state and local share, and $845 million the federal share. Add to this $1,098 million in driver's license fees and uncounted millions in other taxes for the states for a true picture.

This picture, one of a few overall reports on highway revenues and spending, cover all types of highway spending, for instance: Highways through country and city areas, toll roads, bridges, tunnels, ferries, new roads and maintenance, traffic signs. These figures put things into focus and may be useful when the U.S. talks next year about stepping up the spending for highways.

G.E. Reports on Electrical Developments...No. 10

10 G-E units drive gas compressors for oil field pressure maintenance.

CREOLE PETROLEUM PLACES WORLD'S LARGEST GAS TURBINE INSTALLATION INTO CONTINUOUS SERVICE IN VENEZUELA

THE LARGEST CONCENTRATION of gas turbine horsepower in the world is operating on a platform over Lake Maracaibo in Venezuela. There, seven miles from shore, ten General Electric gas turbines do a vital job for the Creole Petroleum Corporation: driving centrifugal compressors which maintain gas pressure and thereby increase the yield from the oil fields below.

SUCCESSFUL NEW CONCEPT: Creole's installation represents a new concept in oil field pressure maintenance. The combination of centrifugal compressors and combustion gas turbines is designed to return over 137,000,000 cubic feet of gas per day to the field at a pressure of 1,935 pounds per square inch.

Naturally, reliability was an important reason for the selection of G-E gas turbines. In addition, their light weight simplified the construction of the platform and its pilings. This remarkable installation is an outstanding example of petroleum industry enterprise and a milestone in the progress of the gas turbine.

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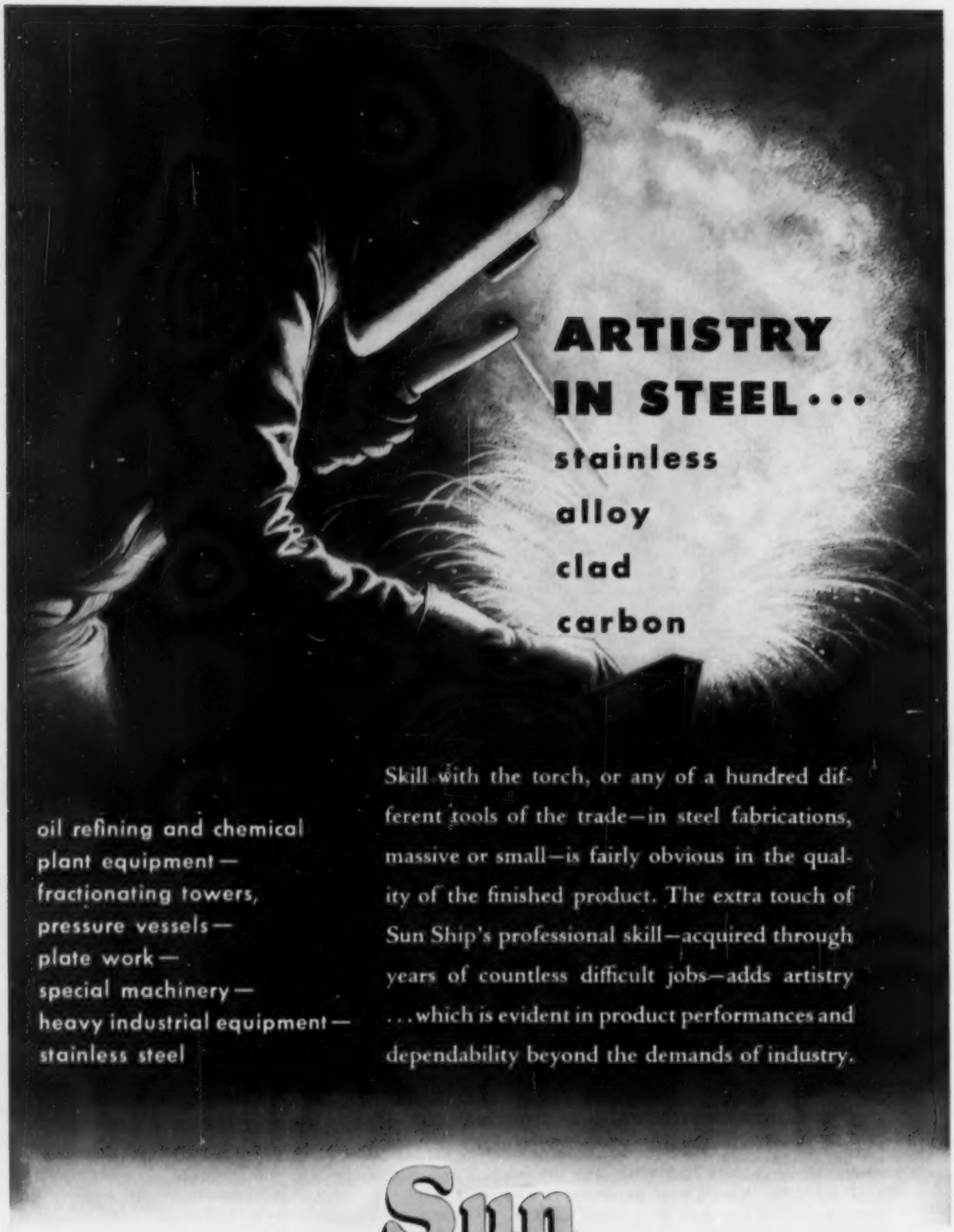
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Ethyl Research analyzes lowest-cost routes to top octanes

At today's octane levels, each small improvement in gasoline quality becomes increasingly expensive.

Can anything be done about it?

Ethyl Refinery Technologists have developed analysis techniques which may help define and thus minimize these costs. Key to analysis is the study of *incremental* costs . . . or the rates at which costs increase as you raise the octane number. (Handily expressed in cents per Research octane number per barrel—¢ /RONB.)

In your own refinery, an analysis of incremental costs may show that you can most profitably gain your top octanes by one of several processing alternatives. Or it may show that the cheapest route is to add lead up to the full 3 cc. Such a study can be very rewarding.

Our Refinery Technology staff is available to help you initiate and check your own analysis. Or if you prefer, we are equipped to do a complete economic analysis for you.

For more information, call your Ethyl Representative. He'll be glad to arrange an appointment for you with one of our Refinery Technologists.

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The first successful plane, developed by Wilbur and Orville Wright, took off December 17, 1903. On this famous flight *Mobiloil* protected the engine of the Wrights' tiny biplane.

Early racing champion, Ralph DePalma, drove to fame on old-time dirt tracks. In 1915 this two-time National AAA Winner set Indianapolis Race record of 89 mph *with Mobiloil!*

1909 Blue Ribbon Holder, H.M.S. Mauretania, held the North Atlantic speed record for 22 years. Like every Blue Ribbon winner since, she was protected by the *makers of Mobiloil!*

The first Diesel engine was developed in Germany in 1897. Rudolph Diesel, the inventor, solved his lubrication problem with special oils developed by the *makers of Mobiloil!*

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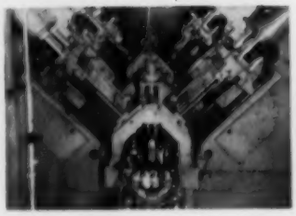
Today's modern planes fly thousands of non-stop miles . . . travel coast to coast in hours. Socony Mobil helped make this rapid progress possible by continually developing the right fuels and lubricants.

19 55 Indianapolis Winner, Bob Sweikert, averaged a sensational 128.209 mph to win this 500-mile classic. He relied on *Mobiloil*—first choice of more drivers than any other brand.

World's First Atomic Powered Submarine, the "Nautilus," is dramatic evidence of a new age. Socony Mobil supplied the Gargoyle Marine Oils that helped in the development and operation of this undersea marvel.



Modern industry's new trend—manufacture through automation—depends on precise hydraulic control. Majority of automated plants call on Socony Mobil's 89 years' experience.

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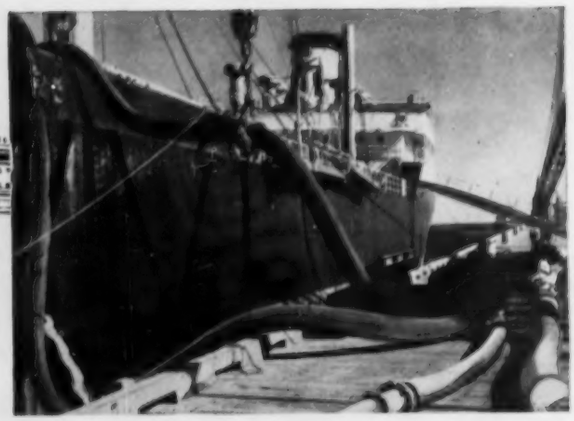
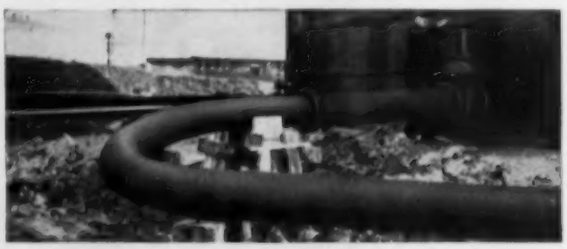


S.S. "Velutina" of the new Shell Fleet, loading crude oil with Dunlop Clipper-type sea-loading hose. This hose incorporates high-quality, hard-wearing oil-resistant synthetic rubber compounds and internal wire reinforcement and can handle many tons of crude oil per hour during a long and efficient service-life.



Dunlop Oil Suction and Discharge Hose bridging the gap between pipe line and storage tank. This type incorporates high-quality, hard-wearing, oil-resistant synthetic rubber compounds, and is suitable for the severest conditions.

Dunlop Oil Suction and Discharge Hose to British Standard Specification 1434 Type B. This 8" bore hose is suitable for use at working pressures up to 200 lb./sq. in. Photograph shows the hose at one stage of the rigorous testing programme to which every length is subjected.

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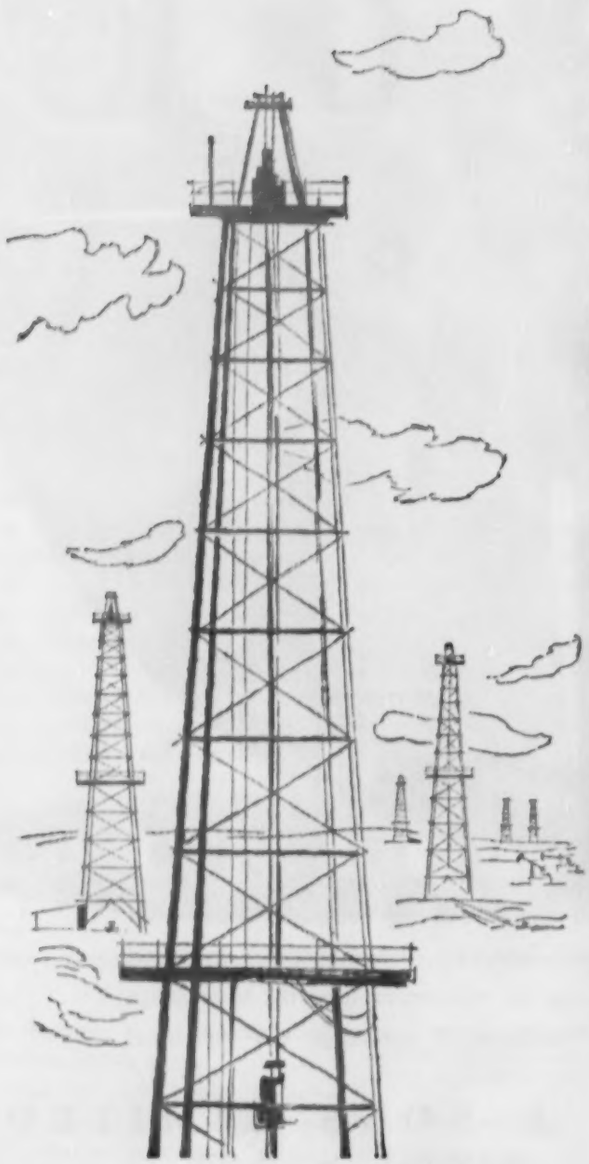
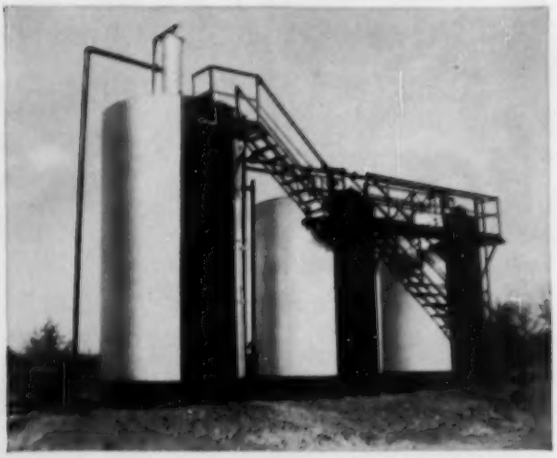
from well-head





From nine strategically located cities GRAVER SUPPLY COMPANY sells Graver-fabricated lease tanks, walkways, oil and gas separators, heaters, and other well-head equipment.

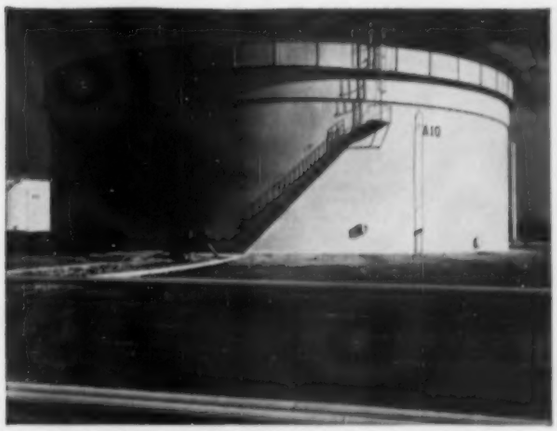
The Graver Sphericone Hot Process Softener, with or without hot zeolite after treatment, produces a safe boiler feedwater. GRAVER WATER CONDITIONING COMPANY also supplies standard hot process units and hot zeolite systems which can be added to existing hot process units.

Industry

to market

GRAVER CONSTRUCTION COMPANY, INC., builds and maintains pipeline stations, refineries and other petroleum installations. *Guaranteed* customer satisfaction is a part of every Graver job.

GRAVER'S unequaled fabricating skill in steel and alloys is seen in the many towers and intricate process vessels constructed for the country's leading petroleum companies.



The GRAVER EXPANSION ROOF TANK represents the ultimate in modern conservation equipment. It is but one of Graver's many "tailor-made" designs that helps conserve petroleum products.

GRAVER serves the marketing needs of the Industry with the Double-deck and Center-weighted Floating Roof Tanks . . . with cone roof tanks . . . and shop-built tanks (to 30,000 gallons).

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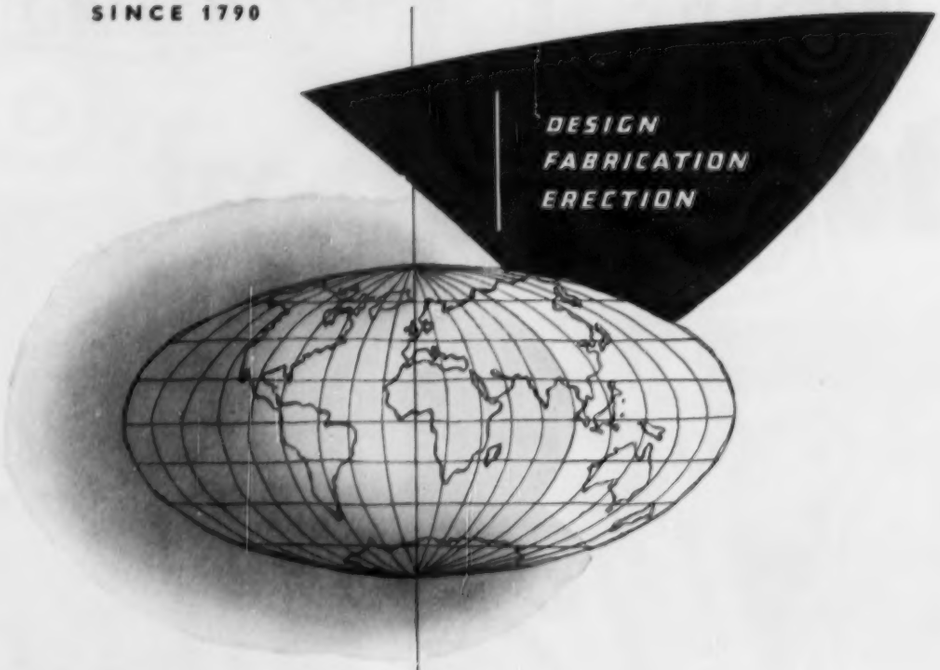

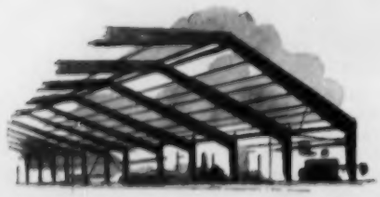

Constructional Steelwork

Examples of Butterley structural steelwork are to be found in all parts of this country and in many countries overseas. In recent years, experiments to perfect methods of welded structure have been highly successful.

Bridge Construction

Railway and road bridges built by Butterley have been supplied to undertakings in Great Britain and many countries abroad. The Butterley Company was one of the pioneers of the "rolling-in" method now universally adopted. To-day, welded methods are widely used, but many bridges are still of riveted construction.

Standard Unit Bridges

Butterley Standard Unit Bridges are in use in many countries providing the ideal solution to speedy bridge construction in places where site preparation is difficult or skilled labor scarce. From five standard units all sizes of bridge can be built.

Also makers of overhead electric traveling cranes, mining and sheet metal machinery, railway wagons and mine cars, Meehanite castings and wrought iron.

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ON A SUNNY MORNING in 1952 nine men walk to work. They are Australians walking into the biggest thing their country has seen for years, a 3-year epic that will change a desolate area of scrub and sand into the Continent's largest, most important oil refinery: Kwinana!

Kwinana, on the shores of Cockburn Sound, 12 miles from Fremantle, was completed months ahead of schedule! Now, this £A40,000,000 project can handle 3 million tons of Middle East crude a year, possesses its own oil port, and a jetty which is large enough to take three tankers at a time.

Here is the familiar 20th Century skyline: slim, steel towers, bulbous spherical storage tanks, the huge tower of the catalytic cracking plant dominating a landscape where miles of piping stretch across the sand.

And for the men who work at Kwinana there is a township to settle in, to bring up their families in. History is being made, a future is being born.

Behind the achievement is the Kwinana Construction Group (Pty.) Ltd. This consortium of three British companies was formed to build the entire plant for Australasian Petroleum Company (an associate of the British Petroleum Co. Ltd.) to the designs of the M. W. Kellogg Co. and the Kellogg International Corporation. So successful has this consortium been that the association will continue to build and to design similar installations throughout the world.

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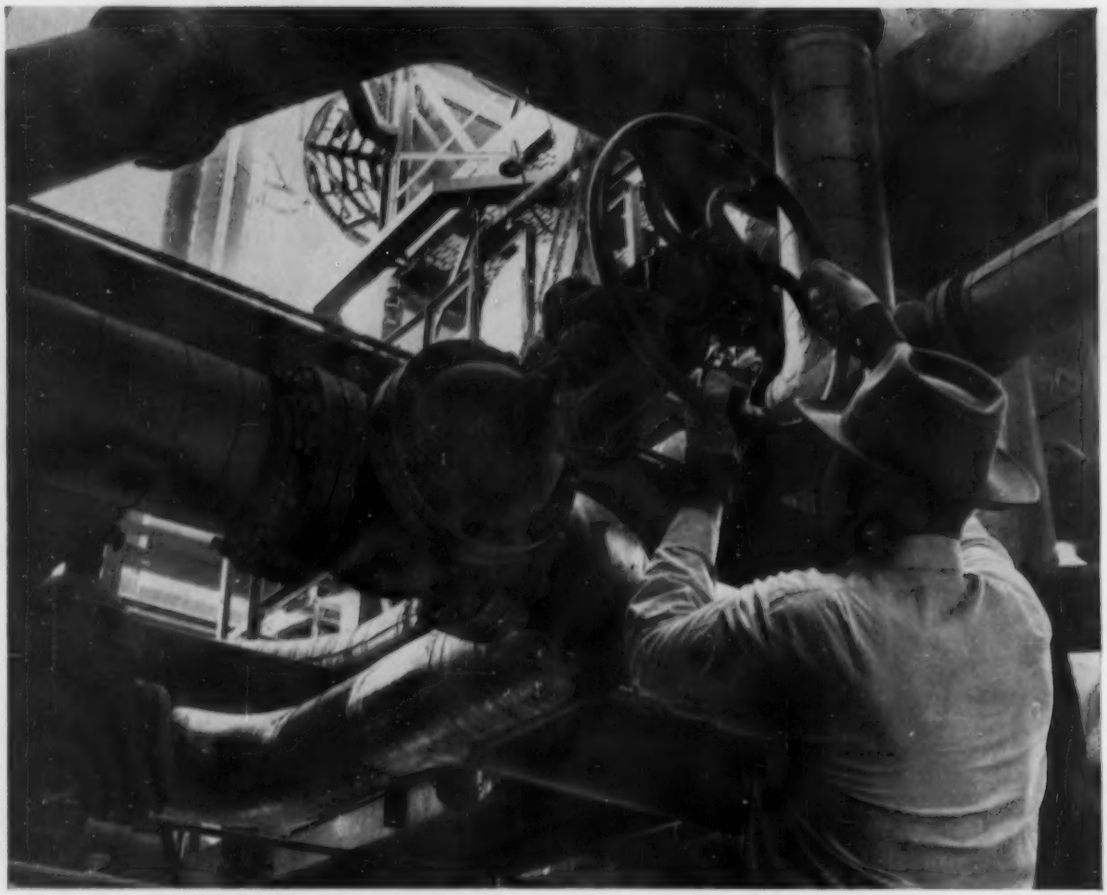


8 years on 600° F. oil...
and never a wrench on these Crane Valves

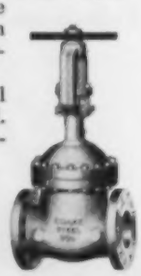
THE CASE HISTORY—Here is one of the 8-inch, 300-pound Crane steel gate valves in service on a crude unit at Cities Service Oil Co.'s Ponca City refinery. They're on the 600° F. oil transfer line from the furnace where they were installed more than 8 years ago.

The refinery's engineers chose No. 33X gates to stop a condition of continual leakage at the packing glands with other makes of valves formerly used. They did that—and more. In service continuously, the Crane valves have needed no maintenance whatsoever—have never leaked—and to date are giving tight closure with easy operation.

There's a difference in steel gate valves that doesn't show on the surface. In Crane valves, it's in the 100-year skill with which Crane makes castings . . . the care given to design . . . the closely controlled heat treating and finishing of Crane Exelloy seating. These added values account for the outstanding low-cost performance record of Crane valves in the petroleum industry.

In steel gates, globes, angles and checks, Crane gives you complete selection—in sizes up to 24 inches—in pressure classes up to 2500 pounds. Your local Crane Representative can give you valuable help in specifying and ordering these valves.

Crane Co., General Offices, Chicago 5, Ill. Branches and Wholesalers in all areas.



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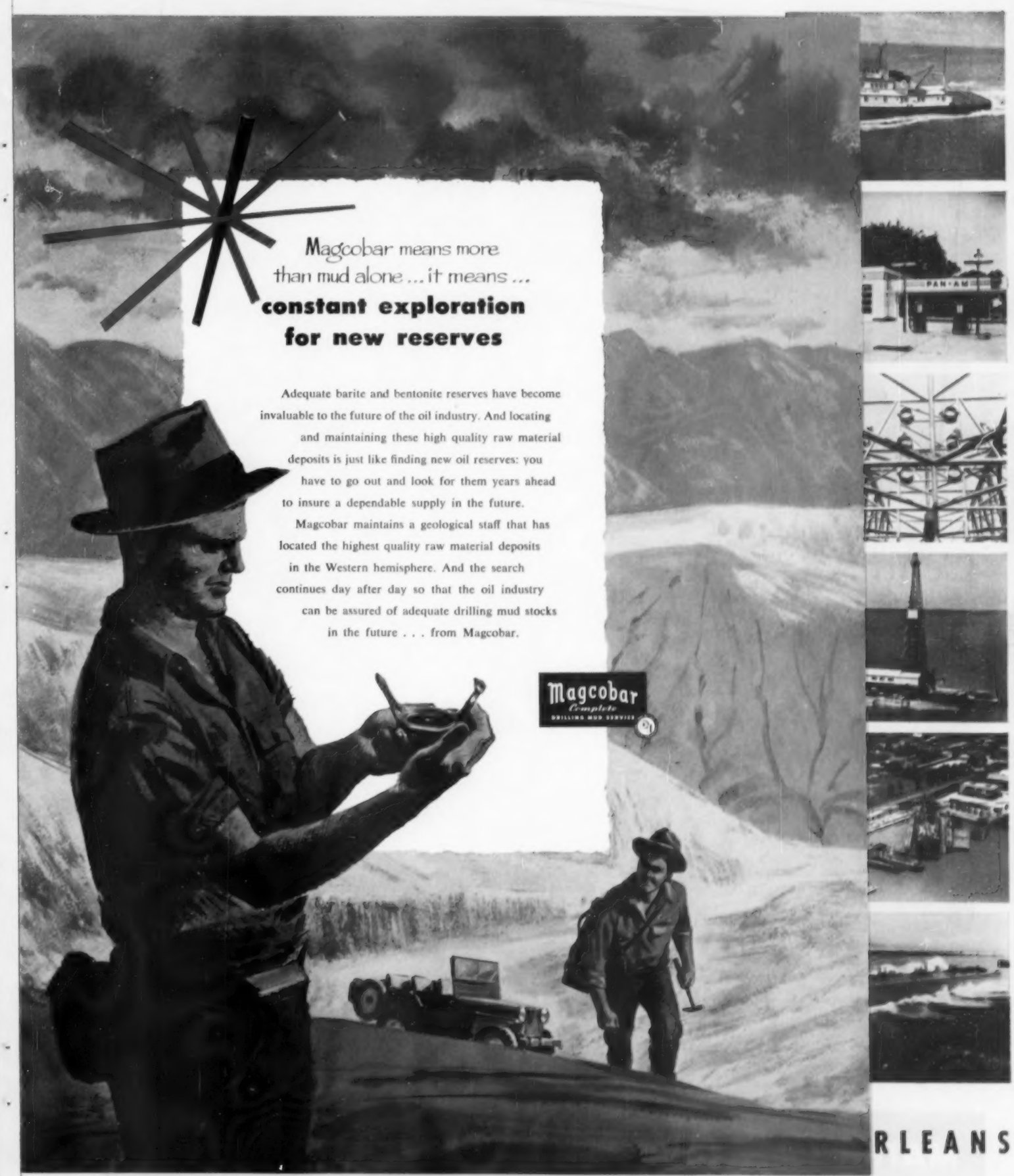
CRANE'S FIRST CENTURY...1855-1955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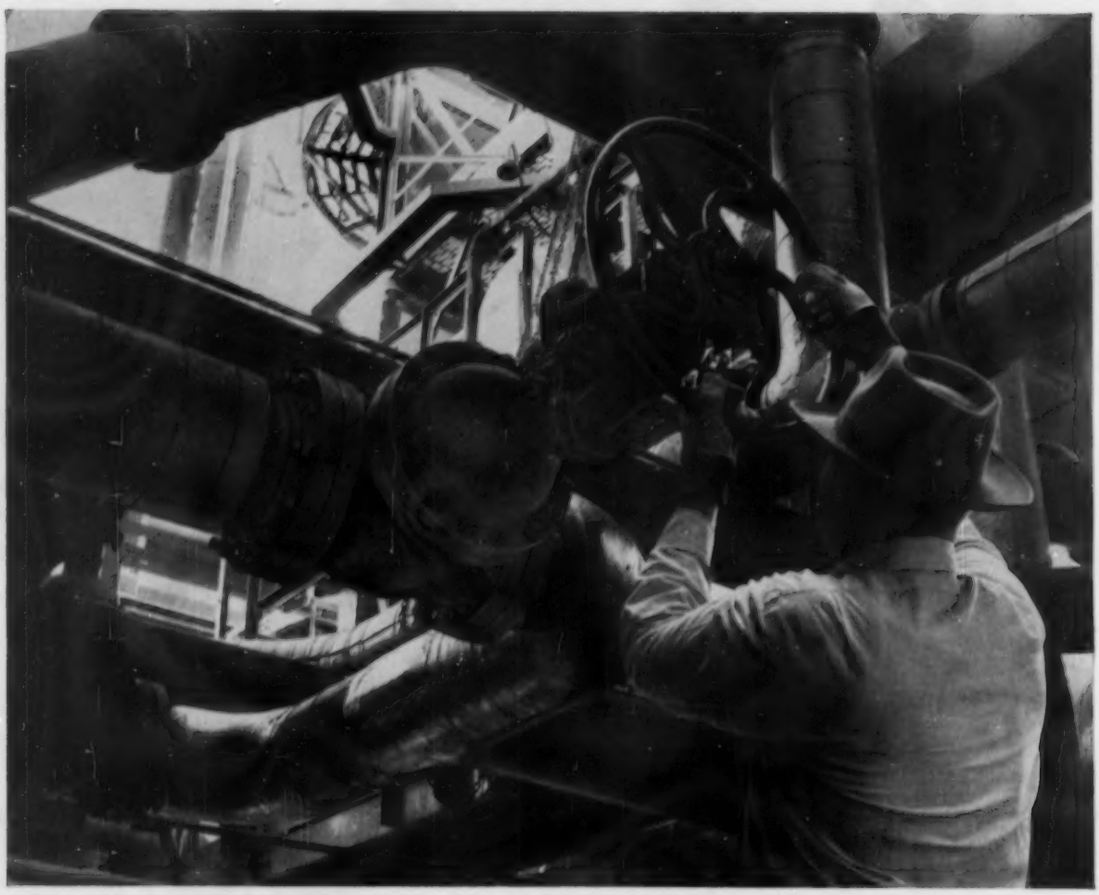

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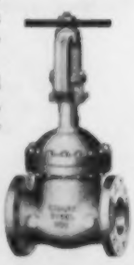

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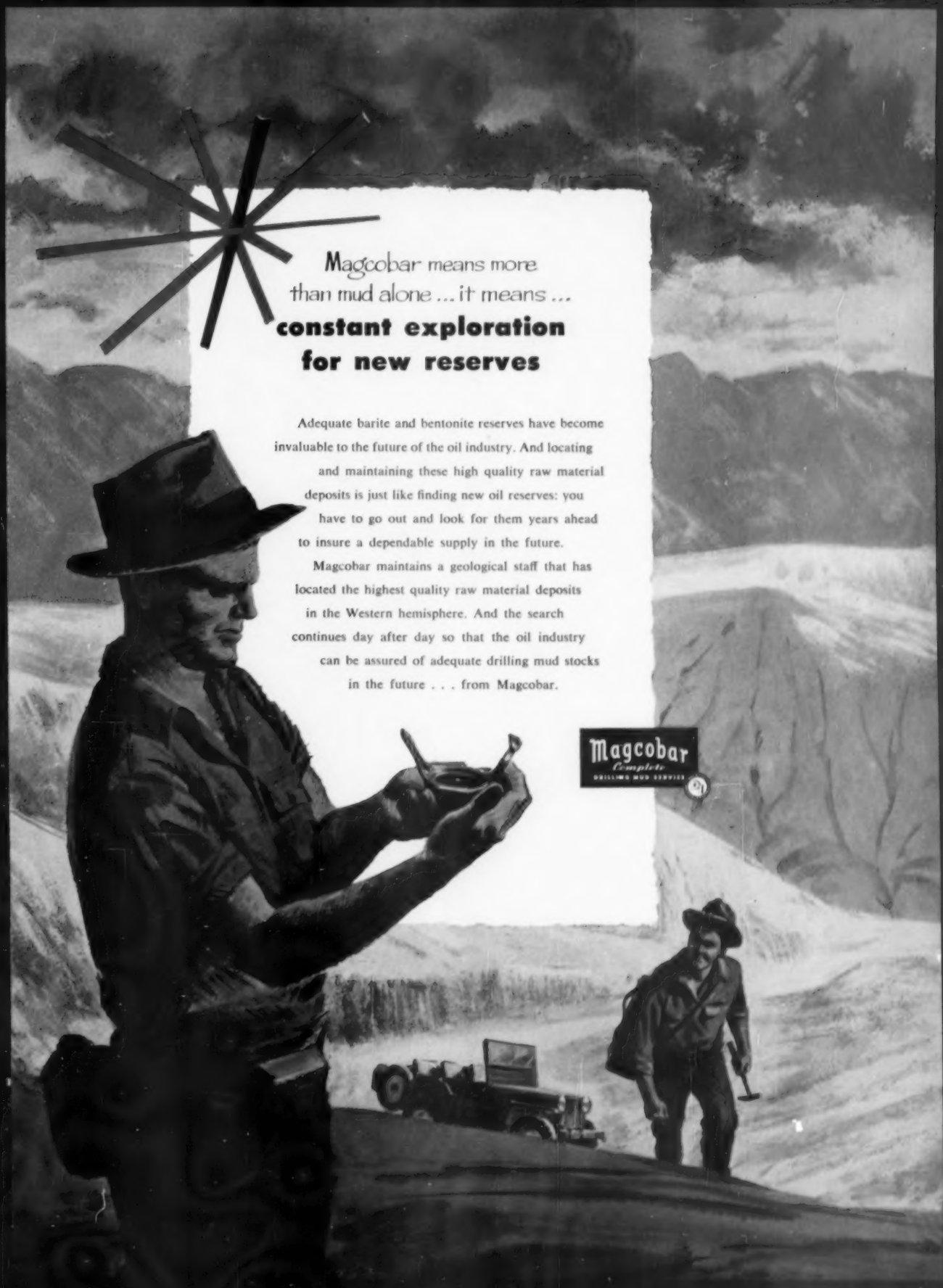
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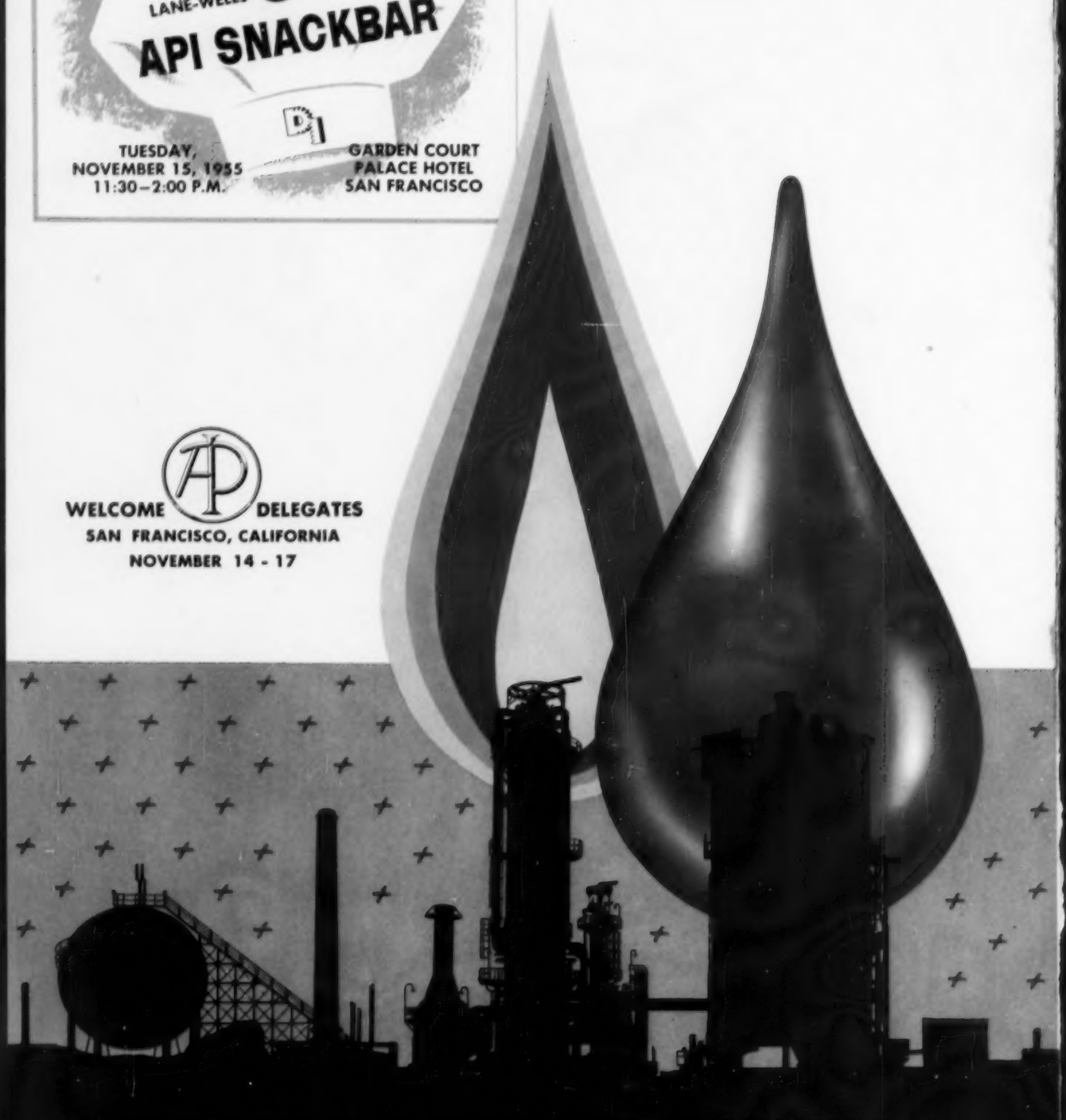

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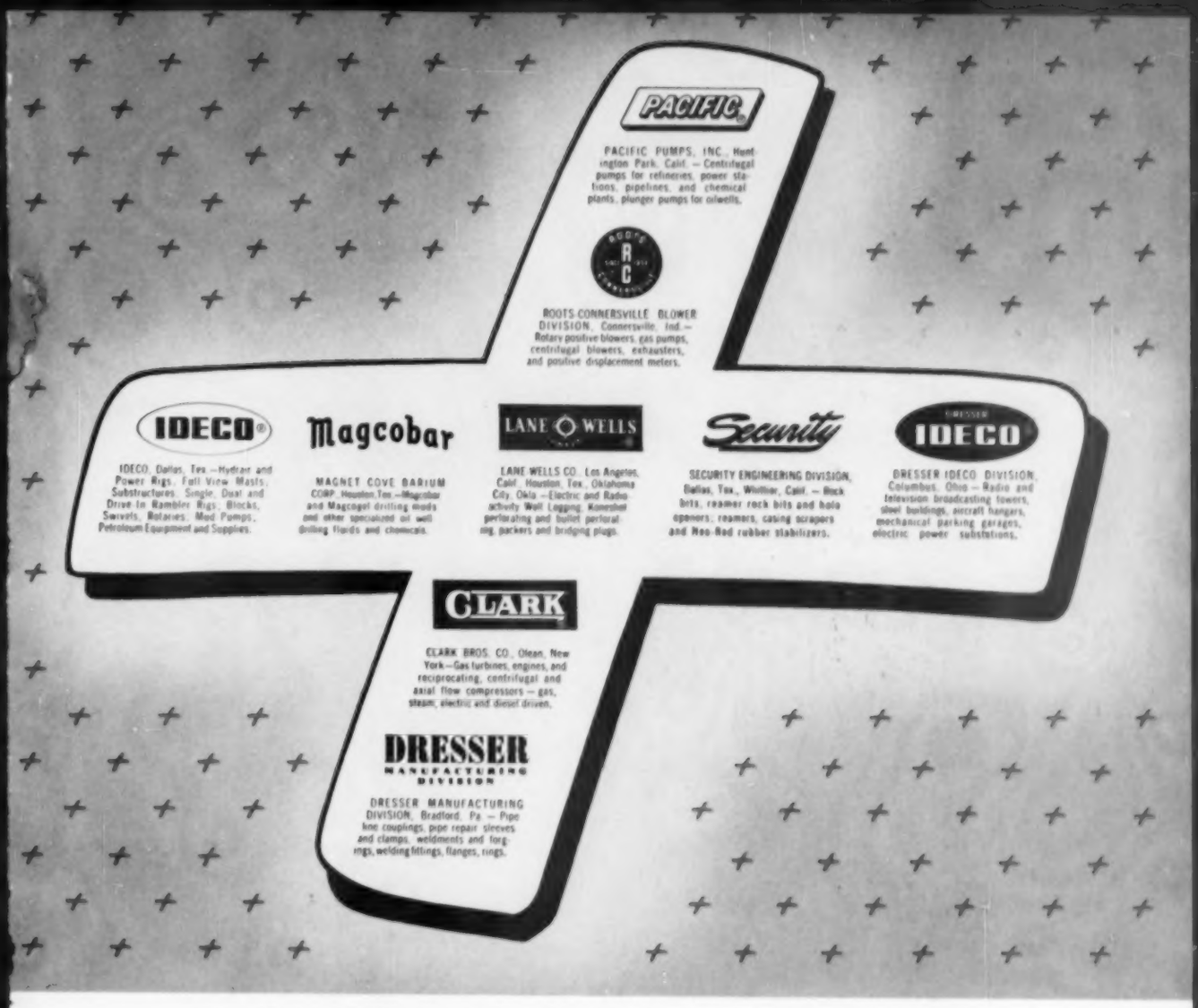
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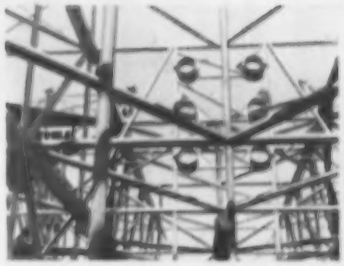

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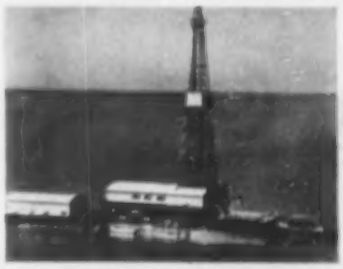

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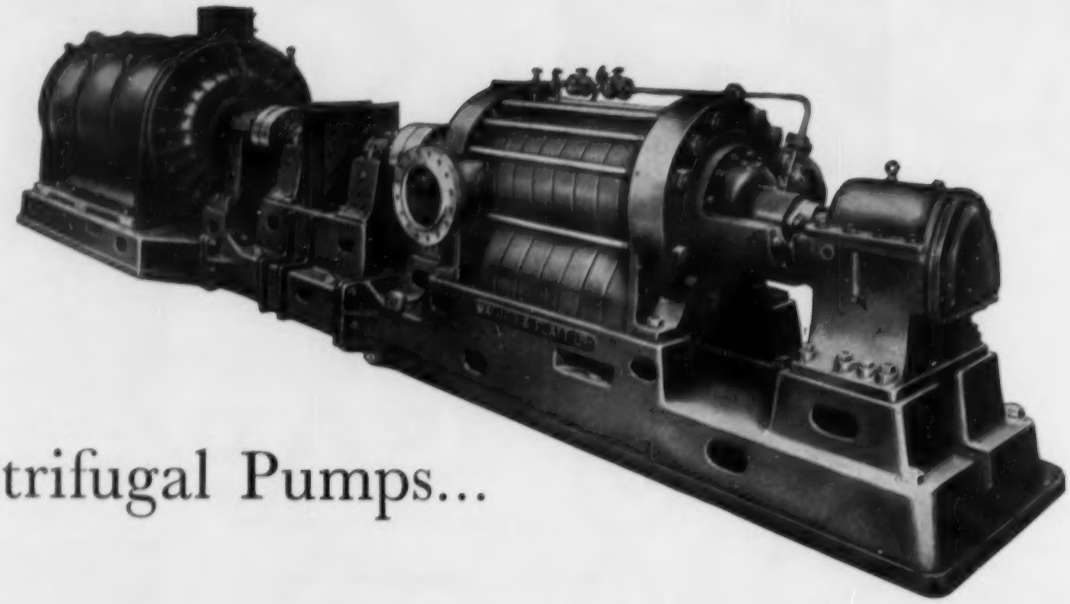

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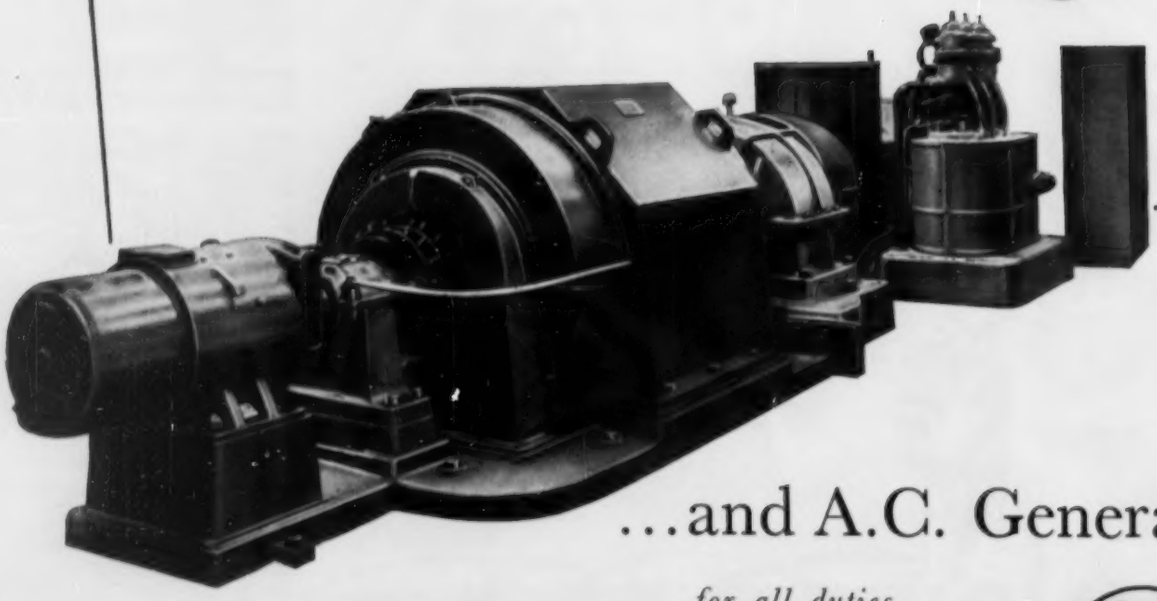

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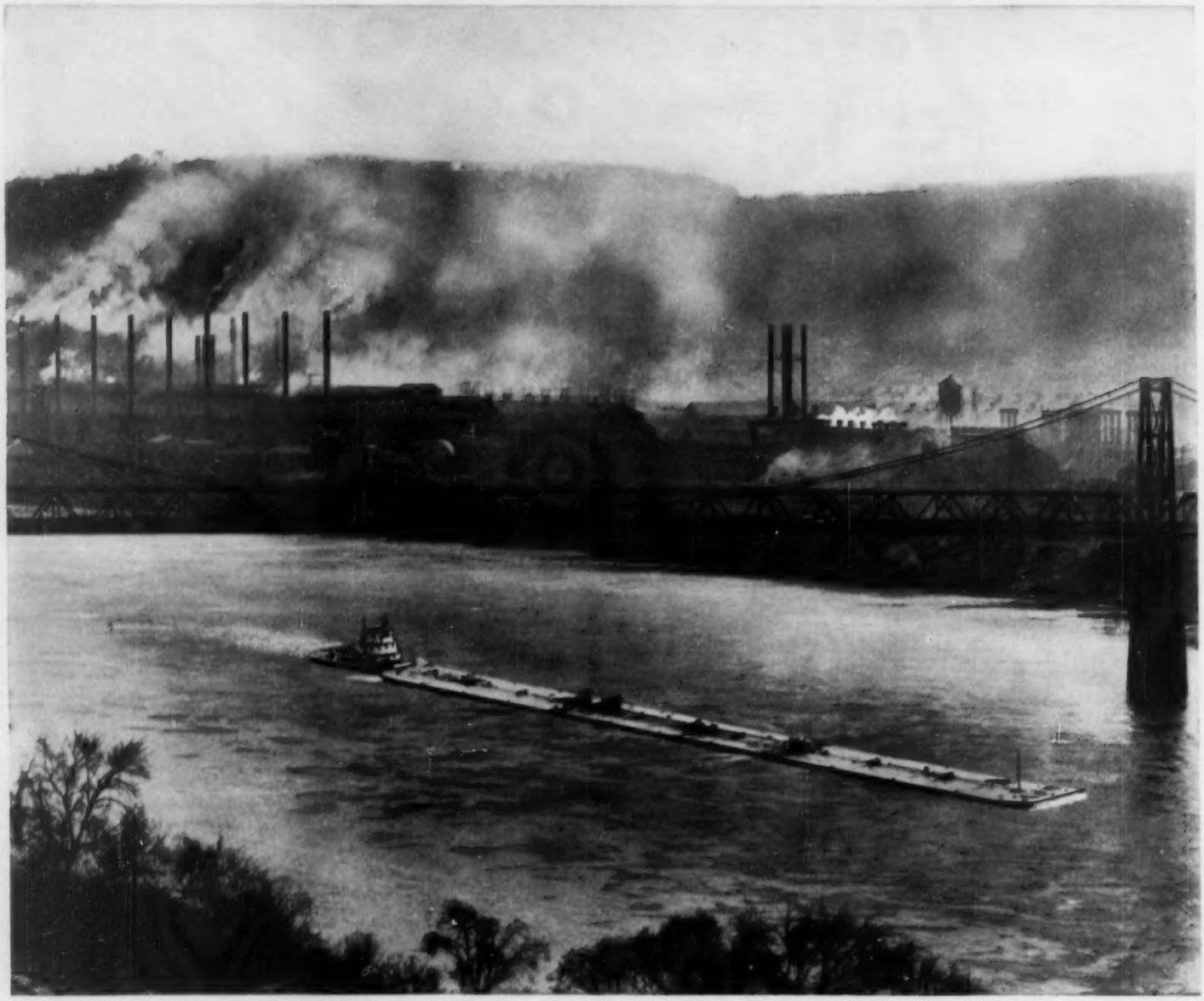

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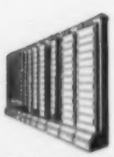

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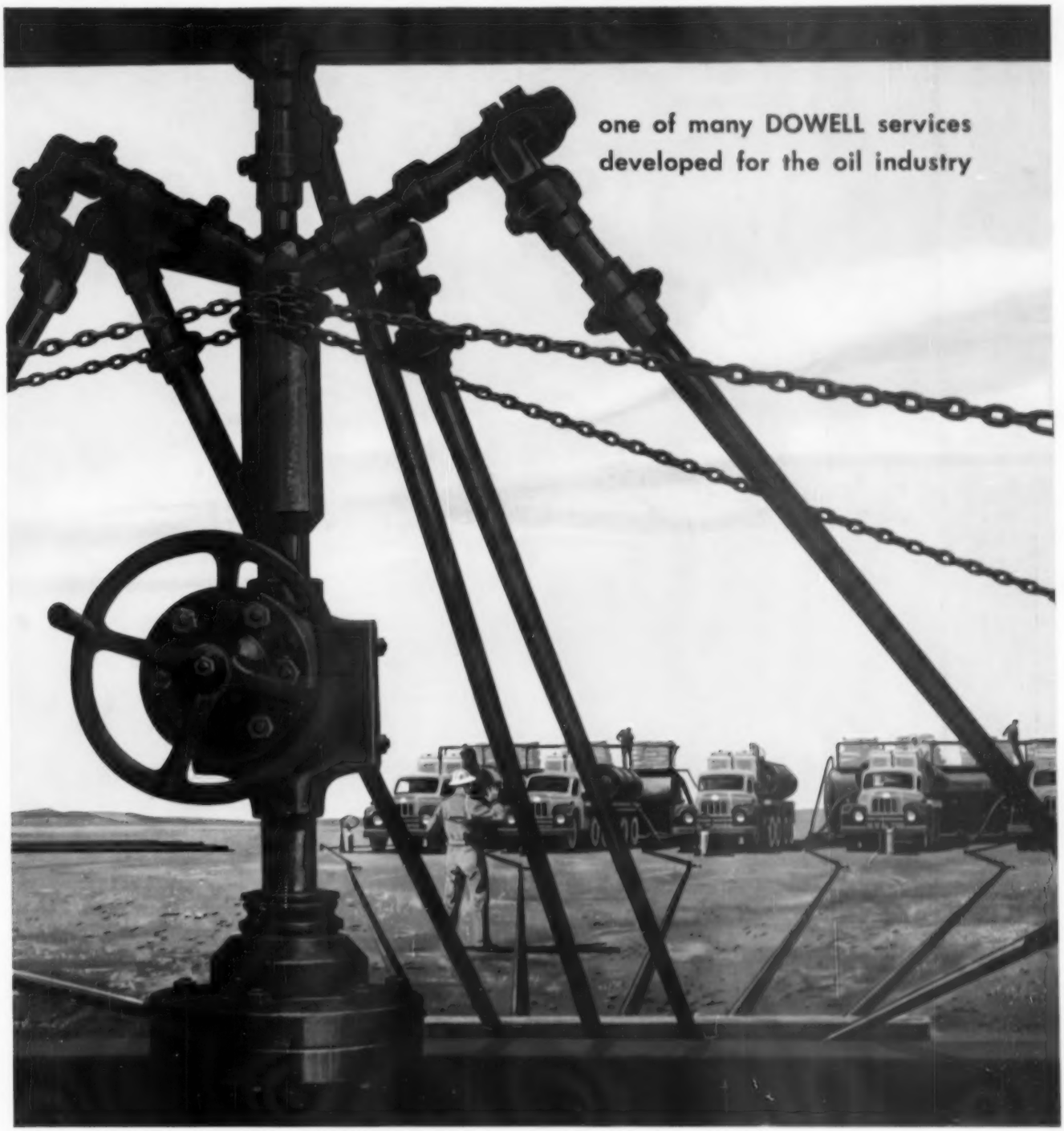

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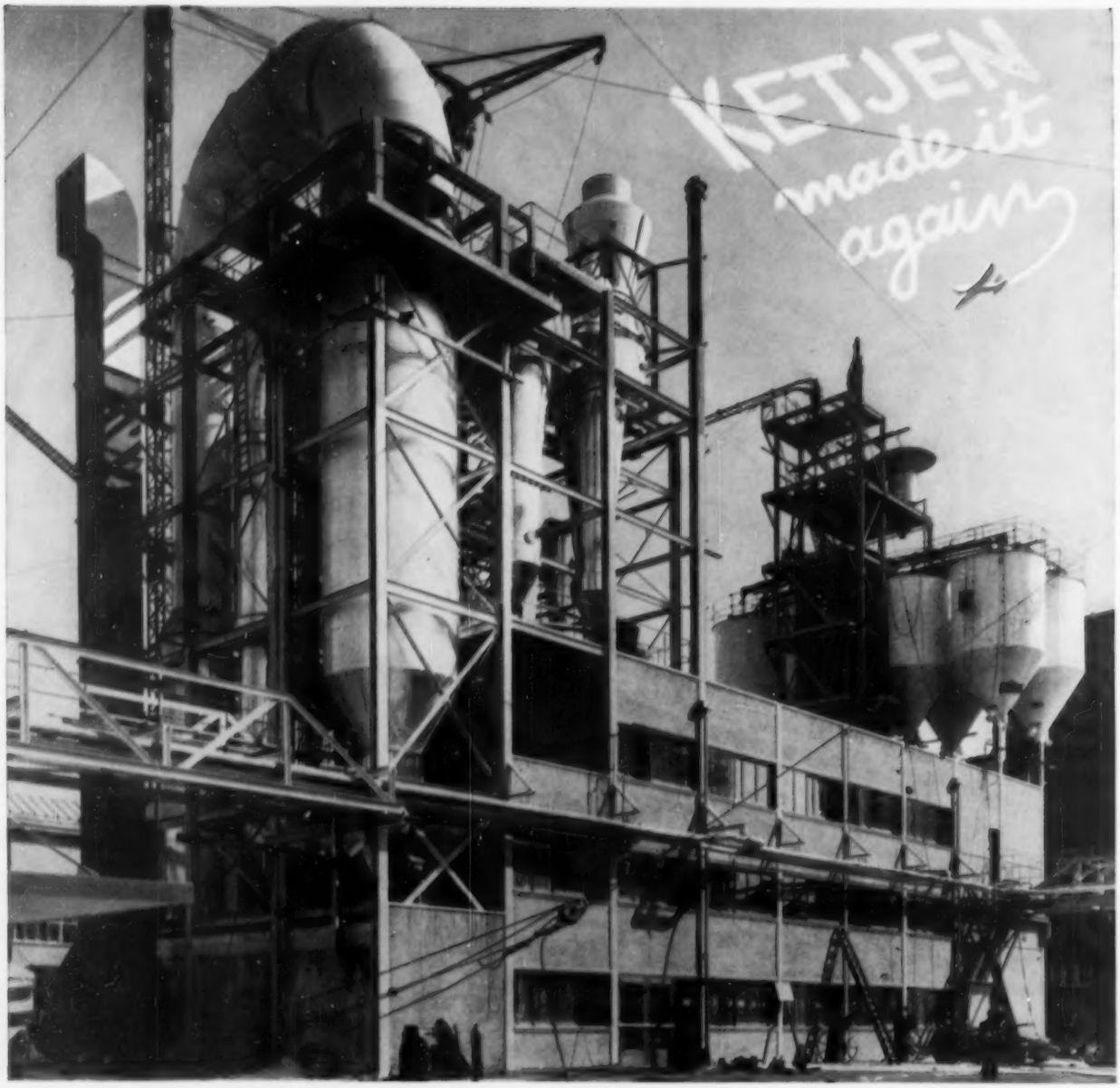

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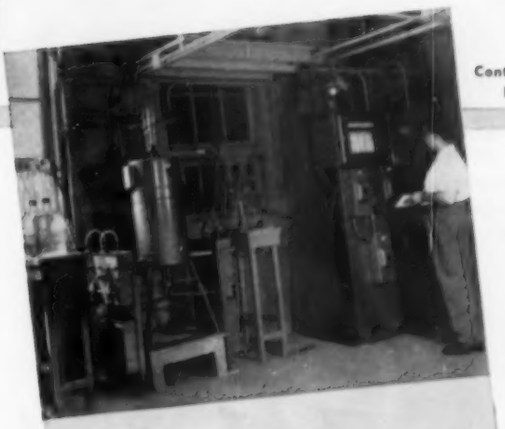
HIGH-ALUMINA
CRACKING CATALYST

Specify

Nalcat HA-1 or HA-2



Continuous quality control and research progress are the products of Nalco Catalyst Division Laboratories.

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Production and Service to Match Petroleum Industry Progress

● If you are exploring the possibilities of high-alumina catalyst for your cracking operations, check on Nalcat HA-1 and HA-2 for research and production use. These high-alumina formulas are available in whatever quantities you require, promptly . . . as a part of the Nalco policy of *Service* to the Petroleum Industry.

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NATIONAL ALUMINATE CORPORATION
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Why is microwave communication so economical? The main reason is: it is *physically discontinuous!*

Between antennas... tens of miles apart... no legal right-of-way must be negotiated and purchased... no pole-line raised... no wires strung. Microwave installations made throughout the world by companies of International Telelphone and Telegraph Corporation prove these facts to be of major importance... especially where circuits must traverse cities, rivers, bays, swamps, deserts, jungles, and mountain ranges.

Matching the rightness of microwave for right-of-way companies is the simplicity, flexibility, versatility, and dependability of *Federal* Microwave... developed cooperatively by IT&T microwave specialists in 10 countries and proved-in by installations in the United States and 16 countries around the globe.

Today, pipelines, power utilities, railroads, airlines, telephone, and other right-of-way companies... whatever their circuit requirements... can look with confidence to the quality and performance of *Federal* Microwave... the system that's *"Certified by a World of Research!"*

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In Canada: Standard Telephones and Cables Mfg. Co. (Canada) Ltd., Montreal, P. Q.

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The first modern petroleum refinery in the Republic of Turkey is now on stream. Crude is supplied by a field gathering system and pipe line that began operation in December, 1953. Complete design, procurement of materials, construction, personnel training, and initial operation were performed by PARSONS for Türkiye Petrolleri Anonim Ortaklığı.

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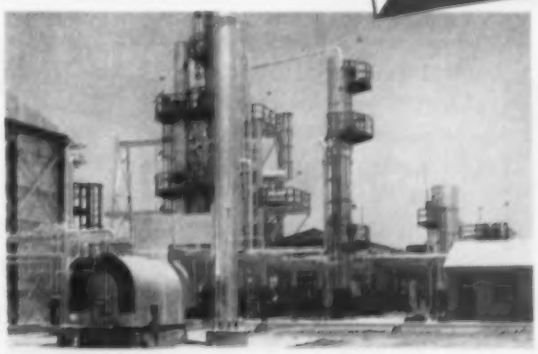

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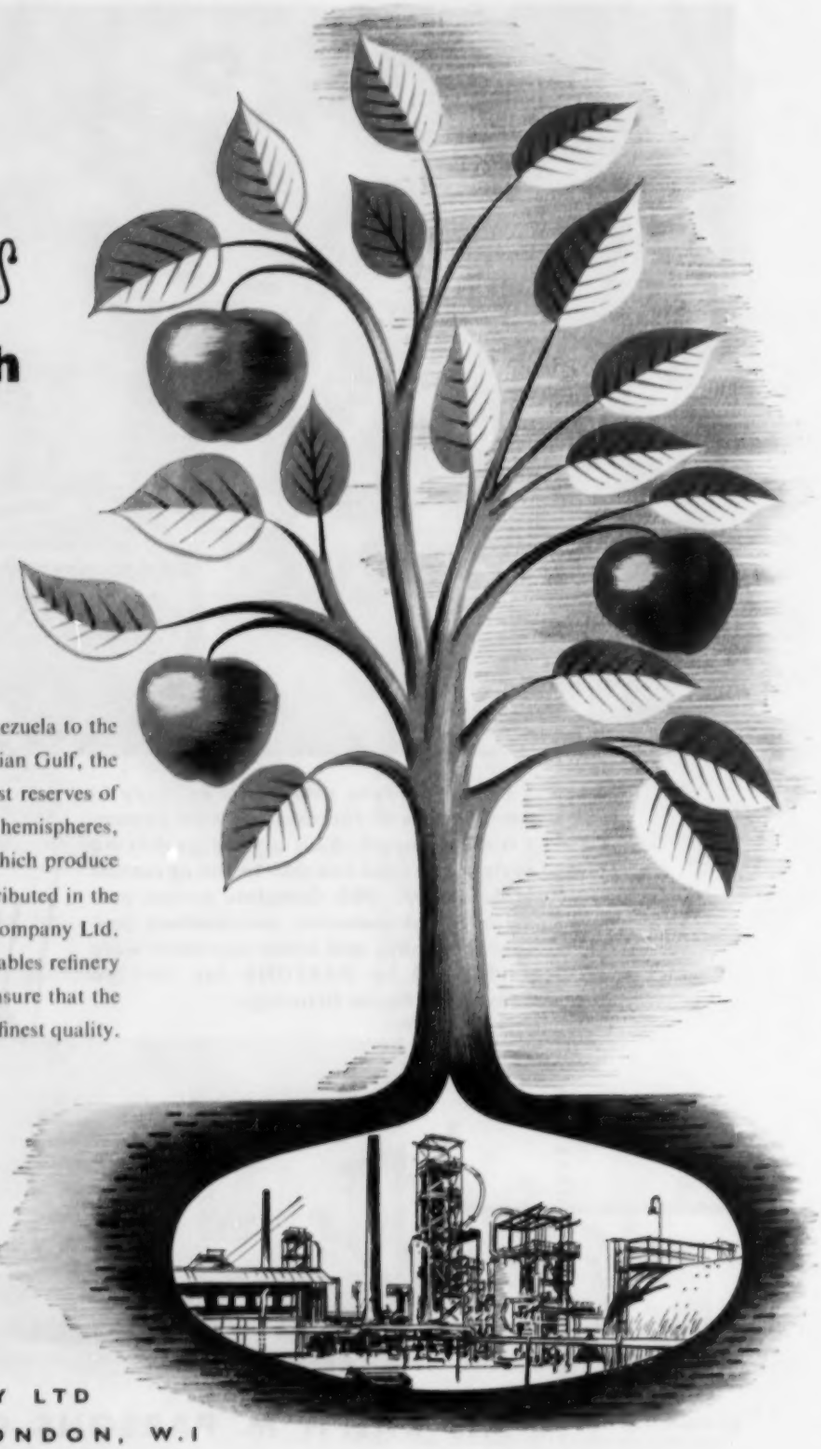

From the jungles of Venezuela to the deserts of the Persian Gulf, the Earth is yielding her richest reserves of crude oils. From both hemispheres, crude oil is pumped to the Refineries which produce the products distributed in the United Kingdom by the Regent Oil Company Ltd. A wide variety of crude oils enables refinery technicians to ensure that the full range of petroleum products are of the finest quality.

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. . . land of friendly, freedom-loving people . . . home of the stalwart Maori . . . island country of more than a hundred thousand square miles, where nature has bestowed grandeur and wonders in abundance . . . it is aptly called "Jewel of the Southern Seas."

NEW ZEALAND . . . Its rich soil, moderate climate and man's diligent labor have combined to produce bountiful crops, sturdy sheep and cattle, and have made this country one of the world's largest exporters of wool, mutton, beef and dairy products. Mineral deposits and timberlands add to the country's natural wealth; its growing enterprises include textiles and clothing, electrical equipment and household appliances, footwear, food canning, motor car assembling, furniture, plastics. As these and other industries expand, the self-reliant people of New Zealand move ever forward toward a better standard of living for all.

Standard-Vacuum is proud of the part its affiliates play in supplying the petroleum products so essential to the welfare and continued growth of New Zealand.

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Wheels of industry the world over are turned

by

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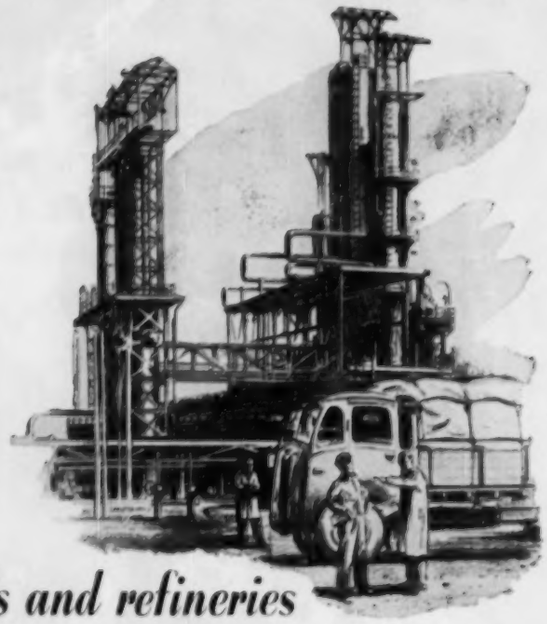
T-H

ELECTRIC MOTORS



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Whenever a power drive is needed, there is a BTH motor that will do the job efficiently and economically. In industries all over the world, BTH motors are helping to increase production. Over half-a-century's experience of this branch of electrical engineering enables BTH to offer the motor with the mounting, enclosure, rating and performance best suited to the application.

BTH factories are exceptionally well equipped to make both ***STANDARD*** *and* ***SPECIAL*** *machines in large quantities*

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EXPLORATION *has changed...*

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SCIENCE has replaced guesswork in almost every kind of modern exploration technique. And the search for oil is no exception.

Western has maintained its foremost position in geophysical surveys with a long list of scientific "firsts" that are working for oil companies the world over . . . working to the most precise standards ever established to make the search for oil an efficient, effective operation.

Whatever your problem or requirement in land or water exploration, Western can help. *Your inquiry is invited.*

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Nordstrom and Audco Valves Prove **Lubrication**

Is The Cheapest Maintenance

LUBRICATION ELIMINATES METAL-TO-METAL FRICTION—the major source of valve wear—for longer life, better performance. Pressurized lubricant also forms a remarkably leakproof seal between the plug and the valve body that is far more effective than the uncertain metal-to-metal seal in ordinary valves where a tiny scratch means leakage . . . and eventually, expensive reseating.

Costly valve down time is practically eliminated with Nordstrom and Audco valves because lubrication stops trouble before it starts. And the lubricant hydraulically cushions the plug for *instant*, quarter-turn operation. Stuck or jammed valves are eliminated.

LUBRICATION IS FAST . . . EASY Nordstrom and Audco valves can be lubricated with a pressure gun directly through the standard Rockwell fitting, or by unscrewing the fitting and inserting lubricant "sticks." Nordstrom and Audco valves can be lubricated while in service.

Like any lubricated mechanism, frequency of use and operating conditions are the determining factors in the lubrication schedule. In any case, the time it takes to lubricate a Nordstrom and Audco valve is an investment in trouble-free, long-life valve service.

LUBRICATION PENNIES SAVE MAINTENANCE DOLLARS A few cents worth of lubricant buys three things: 1. *new seats* (renewing the lubricant is like reseating an ordinary valve) . . . 2. *smooth, dependable operation* and . . . 3. *savings* in terms of lower repair, replacement and down time expenses. It is not the cost of the lubricant that is important, but the *savings* through longer, more dependable life of the working parts and better performance. Over the years, the sale of repair parts has been *less than one-half of one per cent* of Nordstrom and Audco total valve sales!

Whatever your needs, there is a Nordstrom and Audco lubricated plug valve that will do the job with more trouble-free dependability and at lower cost per year than any other valve you've ever used.

For detailed information on valves, and lubricants, best suited to your needs, write: Rockwell Manufacturing Co., International Department, Pittsburgh 8, Pa., U.S.A., or Audley Engineering Co., Ltd., Newport, Shropshire, England.

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DU PONT

PETROLEUM CHEMICALS DIVISION NEWS

DU PONT

November ★ One of a Series of Interest to the Petroleum Industry ★ 1955

NEW DU PONT TEL PLANT NOW UNDER CONSTRUCTION IN CALIFORNIA

On August 24, near Antioch, California, the ground was officially broken for construction of Du Pont's new West Coast tetraethyl lead manufacturing plant. Many local Antioch dignitaries were on hand for the ground breaking ceremony.

This California plant site has much to recommend its choice by Du Pont . . . including the local availability of necessary labor skills, its convenient location in the heart of a growing market for TEL, adequate supplies of power and good water, plus the option of water or rail shipments.

In addition to employing the most modern continuous process methods of manufacturing TEL, the new plant will include a unique new waste disposal system. The waste materials will be discharged into a deep underground well – in excess of 6,000 feet to eliminate any danger of contaminating surface water.

A new plant for manufacturing Du Pont "FREON" is also being built on the Antioch site.

Two lube oil additives to help you sell fleet contracts

For refiners interested in fleet contracts, Du Pont's two polymeric lube oil additives offer special sales advantages, especially with owners of fleets in low-duty, stop-and-start use.

Du Pont Lube Oil Additive 564 and Du Pont Lube Oil Additive 565 provide an economical and effective means of preventing engine oil sludge. They are particularly effective under low-temperature, low-power, stop-and-go driving conditions. Both work as detergents and V. I. improvers.

LOA-564, with its lower molecular weight gives an engine oil with excellent shear stability. The higher molecular weight of LOA-565 gives greater viscosity index improvement.

Both are ashless. They keep engine oil systems clean and free of sludge under severe conditions . . . contribute to longer engine life.

Besides providing extra sales appeal for fleet customers, the benefits of these additives offer exceptional promotion and marketing opportunities with the mass passenger car field. Information and samples are available through your Du Pont representative or sales office.

What Do Your Dealers Really Think...

Of your dealer meetings? . . . Your advertising? . . . Your dealer publications and sales promotion aids?

Report No. 3 of the new Du Pont survey—"The Service Station Operator"—is now off the press. If you want to get behind the scene at the pump island and study the effect of your promotion program on your dealers, you'll surely want to take an early peek at the results of this survey.

Increasing the merchandising savvy of the service station operator is probably the chief objective of all dealer training and promotion programs. But to achieve this, you first need the interest and cooperation of the dealers themselves.

The index of this interest and cooperation can be found, we believe, in the dealers' answers to questions asked them in this recent dealer survey.

Are they helpful?

The dealers were asked how many meetings their company invited them to each year . . . and how many of these they attended. Their answers, you'll find in the survey report, ranged all the way from none to a baker's dozen. But what was accomplished at these meetings is the most important thing.

You'll be glad to know that a large majority of them found the meetings *helpful*. How? Their answers ranged all the way from "sales tips" to "news of trade." And the survey report will also tell you what parts of the program are actually *put to work at the station* by the dealers.

What they want

Some dealers, the survey found, would like to have their supplier companies do *more* for them. And they listed several things specifically. Station modernization was one of the things most frequently mentioned. Many of them also indicated they would like to see revisions in the companies' advertising.

Telling is selling

How do the dealers feel about their supplier's policies on rental arrangements, advertising, competitive pric-

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

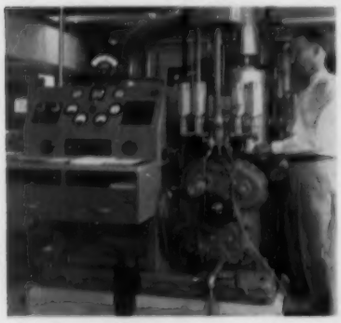
OVER

PETROLEUM CHEMICALS DIVISION
NEWS

New, Modern Regional Laboratory at Tulsa

A complete modernization program has just been completed at the Du Pont Mid-Continent regional laboratory in Tulsa, Oklahoma. The photographs below show how the air-conditioned lab building has been modernized and new equipment added. Improved customer service is the objective.

Over-all view of the new regional laboratory interior. You can also see from this picture that the regional lab people take considerable care with their housekeeping.



H. M. Carey operating the Tulsa lab's new CFR octane number test engine.

The new set-up at the laboratory for analyzing copper, antioxidant and metal deactivator content. This equipment is also used for color work. Blake Portain is shown in the foreground.

MID-CONTINENT REGIONAL LAB MANAGER

E. ODELL CAMPBELL joined the Du Pont Petroleum Chemicals Division in 1951. Since that time he has managed the Division's Mid-Continent regional laboratory in Tulsa, Oklahoma. He is in charge of Du Pont customer service, product testing, and additives treating recommendations in the region.

Following college, he did general petroleum testing, and later was made a Petroleum Chemist in charge of a phase of the research work at the Bureau of Mines Petroleum Experimental Station in Bartlesville.

During World War II he was a commissioned officer in the U. S. Navy. From 1945 to 1951 he served with the Munitions Board. There his job as a chemical engineer included petroleum planning and coordination of technical petroleum problems for the three military services.

Mr. Campbell received his B. A. degree in Chemistry at the University of Oklahoma, and later studied at the University of Arizona and George Washington University. He is a member of the American Chemical Society, Alpha Chi Sigma Fraternity, and the American Association for the Advancement of Science.

E. ODELL CAMPBELL

CONTINUED

Dealer Survey

ing, training programs, etc.? In general, when the dealers know and understand these policies, they like them. However, a large number of dealers, so the survey found, are not aware of their supplier's policies on these matters.

In addition to the above areas, this Report No. 3 delves into the dealer's opinions of dealer publications, overall company advertising and point-of-sale merchandising displays. Their opinions of supplier representatives are also documented. And the report includes information on the dealer's own advertising programs, too.

Complete series of reports

The previous two reports in the series cover (1) such dealer retail functions as station hours, gallonage, credit and mailing lists; and (2) dealer knowledge of products, additives, sales assets and prices. Future reports, to be published soon, will discuss (4) employee-dealer relationships, dealer associations, his educational background and income; and (5) the interrelationship of all the above factors . . . such as how station hours, dealer meetings and education affect sales volume.

Continuing market research

Sponsored by Du Pont, the survey was conducted on a completely impartial basis by National Analysts, Inc. It is nationwide in scope and part of the continuing market research work of the Du Pont Petroleum Chemicals Division. It follows the recent Du Pont survey of service station customer buying habits.

For more information about this survey, just get in touch with any of our representatives or sales offices listed below.

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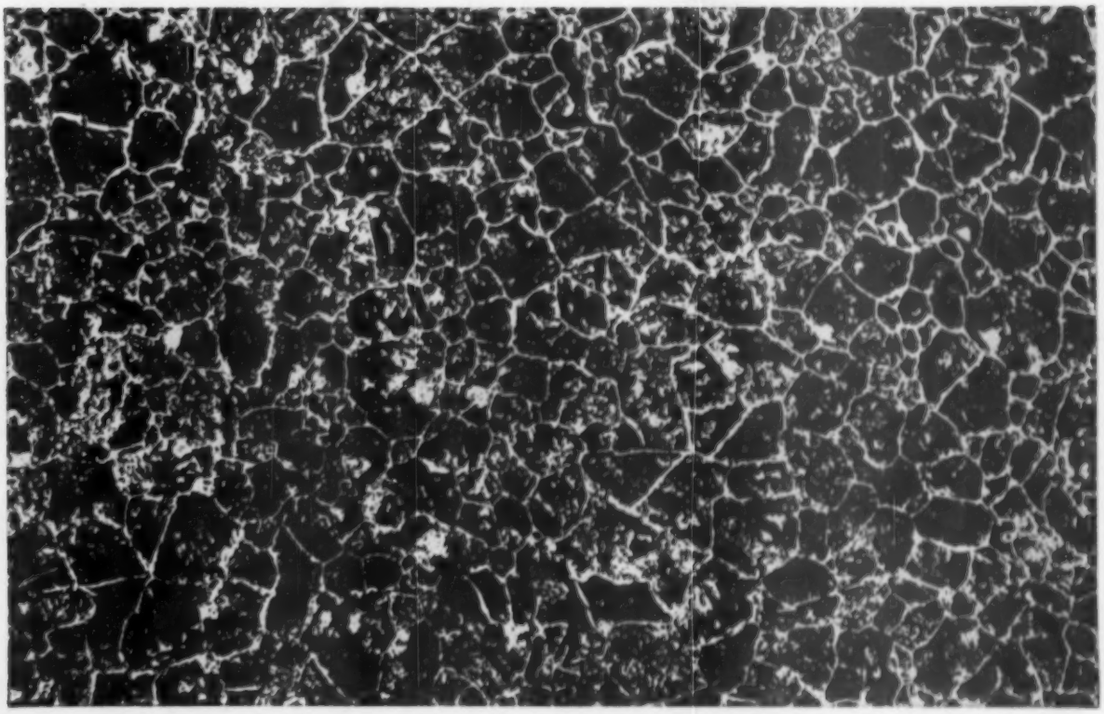


See for yourself why TIMKEN® forging steels give you uniform, high quality forgings

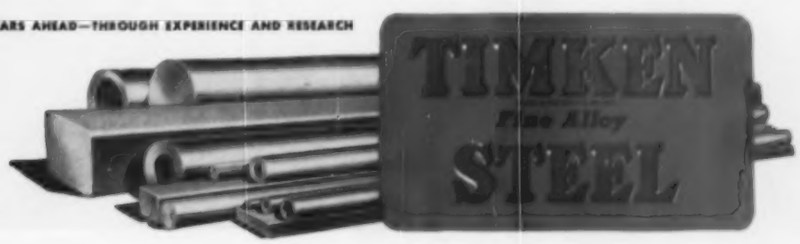
NOTE the uniform grain size in this photomicrograph of Timken® forging steel. We examine every heat of Timken forging steel—spectrographically to assure uniform grain size. As a result, you can be sure that forgings made from Timken forging steels will give you uniformly high ductility and resistance to impact.

Because your order of Timken forging steel is handled individually in our mill we are able to target our conditioning procedure to your particular forging requirements. That minimizes your rejects.

Every lot of Timken forging steel responds uniformly to heat treatment because every lot has the same physical and chemical properties. For example, we rigidly control chemistry with the help of a direct-reading spectrometer which tells us the exact composition in 40 seconds . . . while the steel is still molten.

To top it off, Timken steel forging bars *save* you steel because their good dimensional tolerances produce uniform weight multiples with a minimum of steel lost in flashings. Get all these results in your forgings. Specify Timken forging steels. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH



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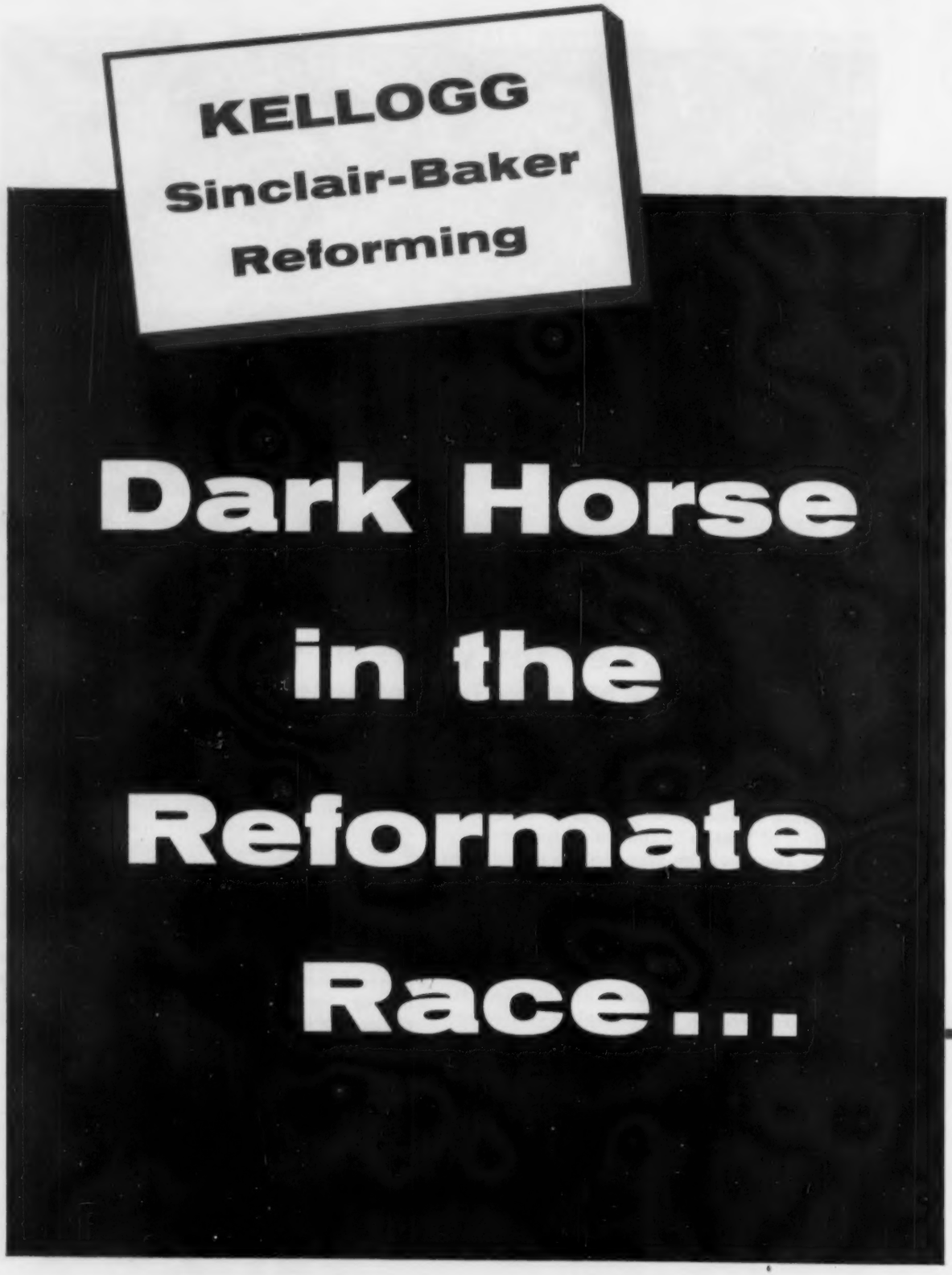
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Sinclair-Baker
Reforming
Dark Horse
in the
Reformate
Race...

New Process and New Catalyst Promise New Records in Production of Low Cost, High Octane Reformates

Although the M.W. Kellogg, Sinclair-Baker process is still too new in service to provide any long-term performance data, and customers' initial findings cannot yet be disclosed, many economic advantages of this catalytic naphtha reforming process have already been firmly established. Any refiner faced with increasing octane yields from present feedstocks, or with getting high octane reformates from lower grade naphthas, will recognize the significance of the following points . . .

Quick Start-Up

Experimental operation is reduced to a minimum. One M. W. Kellogg reforming unit was started on its final test run within two weeks after the catalyst was first charged to the reactors—with octane rating and yield during this 15-day period well in excess of the guarantee.

A Regenerative Catalyst

Sinclair-Baker Platinum Catalyst RD-150 can be regenerated easily and quickly *in situ* to provide many operating cycles, each of many months duration, with negligible loss in catalyst activity. Cost of catalyst per pound in terms of barrels of reformate produced is a major economic factor of the process.

Long Catalyst Life

Sinclair-Baker regenerative catalyst RD-150 has high activity and long initial life. It has been in operation for over one year without supplementing the catalyst. 95 octane reformate can be produced for six months or longer before regeneration is required.

Octane Level

Depending on the feedstock, clear octane ratings above 90 are now being obtained commercially—with 100, and even better, a goal that is entirely feasible and economically practical. *Variability* of octane rating is the keynote of the process, permitting selection of the exact processing conditions for a given naphtha to secure optimum economic operation at all times.

Supply of Catalyst

Use of the process does not obligate refiners to buy Catalyst RD-150 beyond the first year's requirements, although a continuing source of supply can be assured. This freedom from long-term purchase and license agreements is an important consideration when deciding which is the most suitable reforming process.

Low Grade Naphtha Feeds

M. W. Kellogg's unique design permits the effective desulphurization of low grade naphthas as part of the process, and avoids corrosion and metal contamination. Kuwait naphthas thus treated, for example, can produce yields of high octane reformates only slightly lower than those for higher grade Mid-Continent feedstocks.

For More Information

Further details on M. W. Kellogg's catalytic naphtha reforming process, the Sinclair-Baker catalyst, together with some economics of both, are contained in a recent booklet, "Low Cost Production of 95 Octane Clear Reformate." Copy sent on request.

Refinery Process Division

THE M. W. KELLOGG COMPANY

225 Broadway, New York 7, N. Y.

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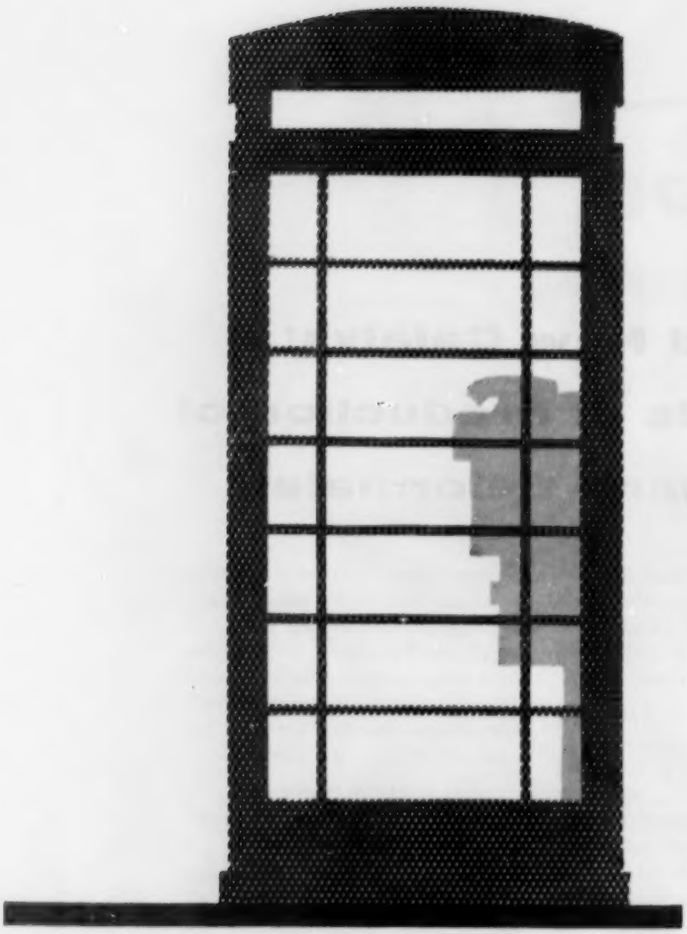

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The call box at your corner, the telephones in your office and home; these things we take for granted. So, too, with *Kenyon Planned Heat Insulation* for steam raising and chemical plants, which includes technical advice on thermal insulation specifications and finishes for all conditions, the supply of materials, application and supervision on sites throughout the world.

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Newman-McEvoy Valves are available with Screwed, Socket Weld or Flanked Ends (illustrated). Valves for 1,000 lbs., 2,000 lbs., 3,000 lbs., 5,000 lbs., and 10,000 lbs. W.O.G. pressures are manufactured in 2", 2½", 3" and 4" sizes. Write for illustrated and descriptive brochure.

These Valves have no equal for Christmas Tree and Flow Line service.

N.H. Christmas Tree fitted with Newman-McEvoy Valves, in service at Seria, British Borneo. Illustration by permission of "SHELL".

Newman, Hender & Co. Ltd. WOODCHESTER STROUD GLOS.

Scammell

FOUR AND SIX WHEEL DRIVE TRUCKS

Illustration above shows one of the many 6 x 6 Scammell "Constructor" Oilfields Bed Tractors operating in Kuwait and other major oilfields of the world.

Built to 'take it' *on or off the highway*

Scammell 4 x 4 "Mountaineer" Oilfield Tractor.

Scammell four and six wheel drive trucks have been specially designed for operation under the most gruelling conditions. In tropical heat, in the Arctic snowy wastes, in soft, sandy or mountainous terrain—in fact wherever the going is rough and tough Scammell trucks provide the complete, economical and reliable answer for every type of oilfield transportation.

Scammell four and six wheel drive oilfield type trucks and tractors have chassis designed for mounting Well-servicing Hoists, Cranes, Excavators, Drill Rigs, Cement Transit Mixers, etc., etc.

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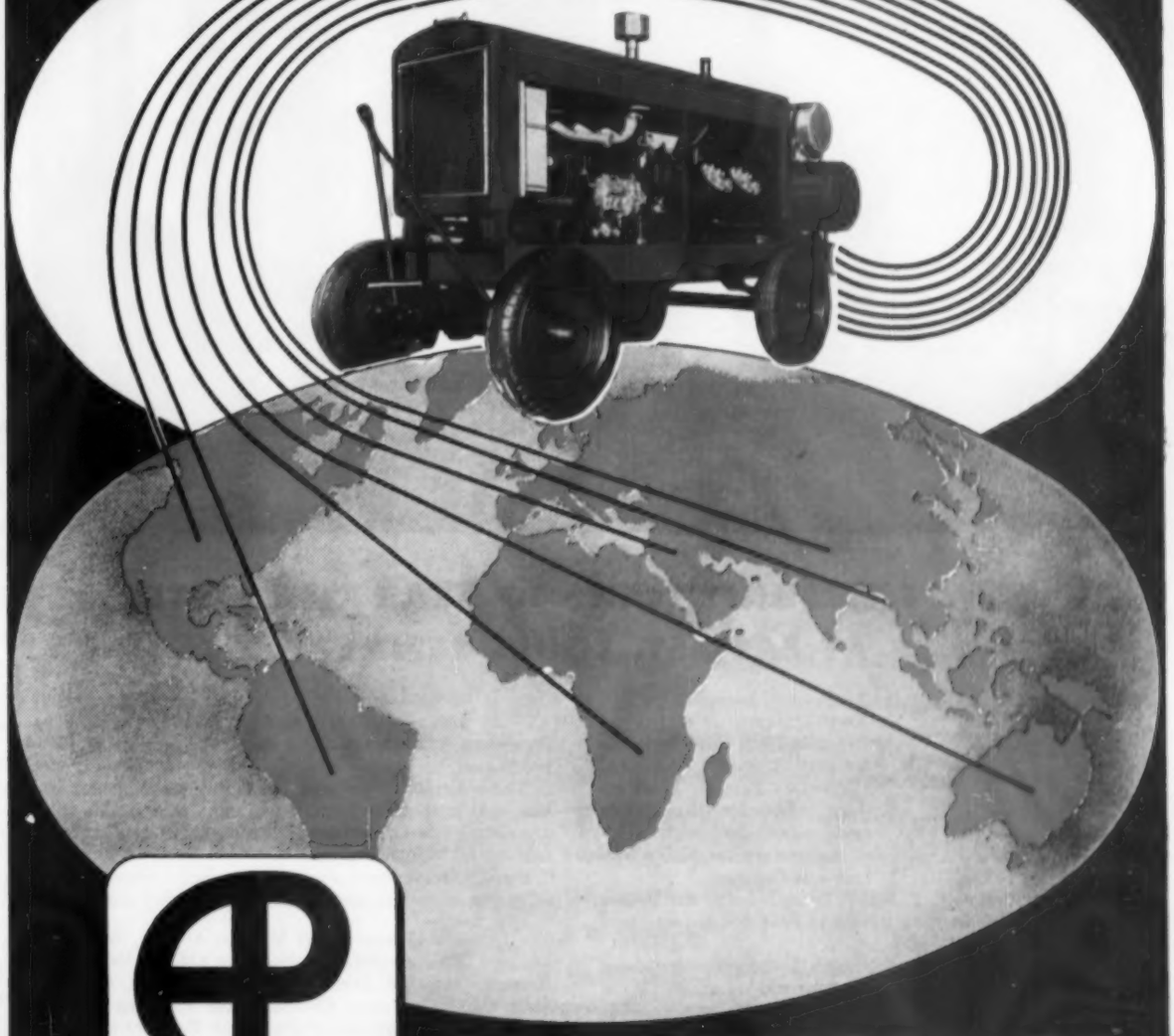

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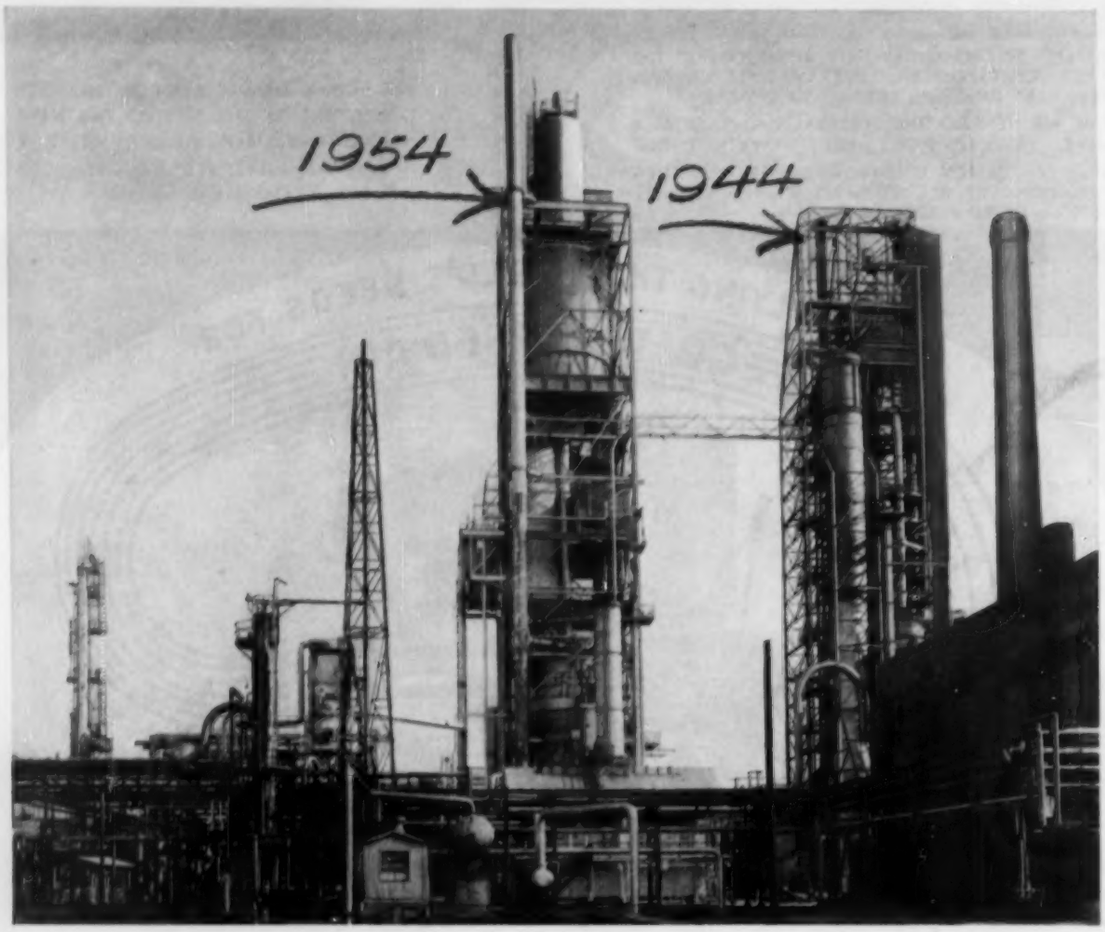

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Two Thermofor Catalytic Cracking Units stand here side by side at Socony Mobil Oil Company's East St. Louis refinery, where for 10 years one stood alone. Both were engineered and constructed by The Lummus Company.

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DESIGNING ENGINEERS AND CONSTRUCTORS
FOR THE PETROLEUM AND CHEMICAL INDUSTRIES

VOL. 26, NO. 12, NOVEMBER, 1955

World Petroleum

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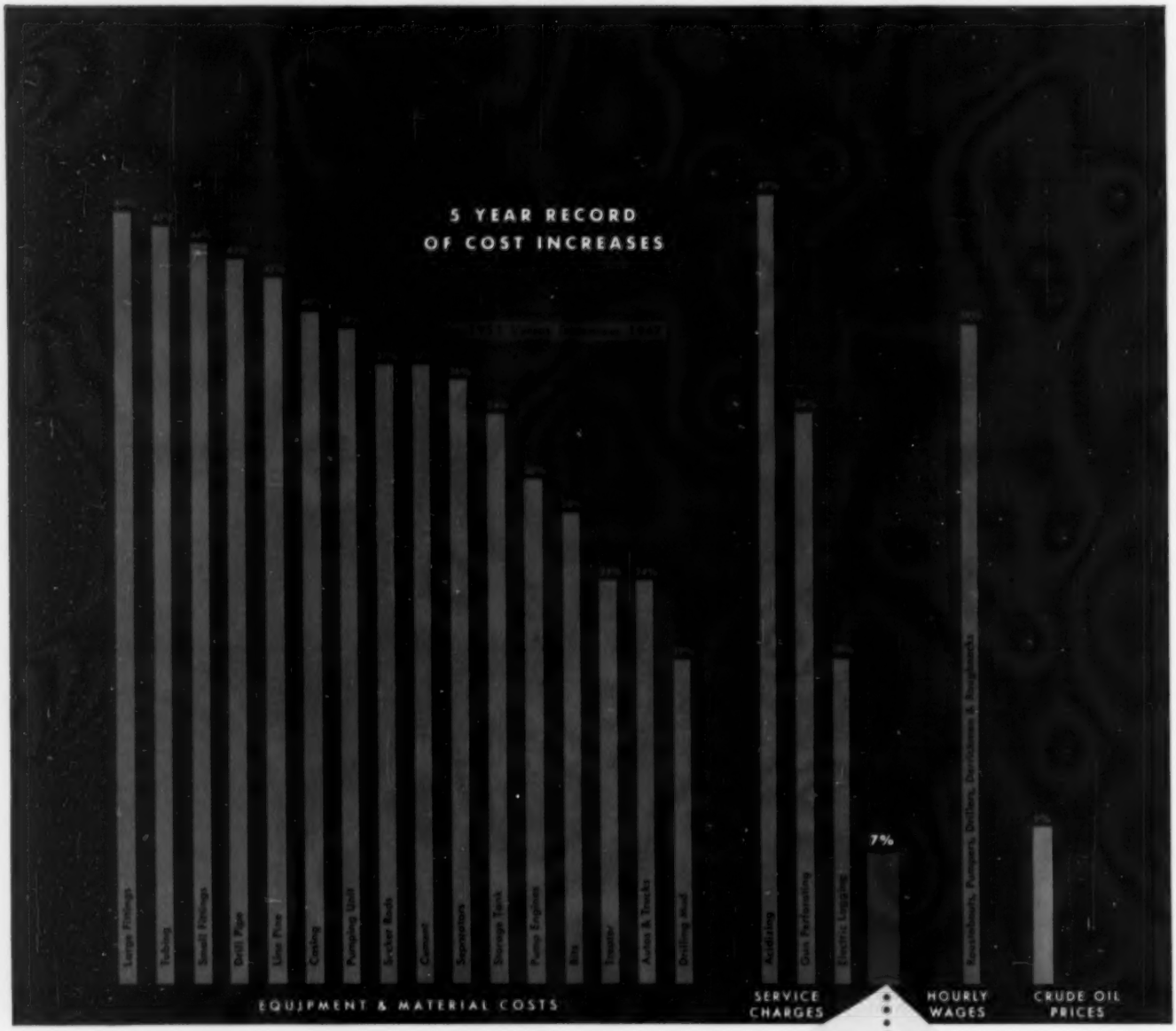
THIS MONTH'S COVER

Ragusa No. 1, first commercial oil discovery in Sicily, brought in by the American Independent Fuel and Petroleum Company, a subsidiary of Gulf Oil Corp. First shipment of crude from the new field was made a year ago. Photograph of the typical Sicilian countryside near the well is by Mrs. Margaret Gordon, and color plates are reproduced through the courtesy of Donald C. White, Editor of *The Orange Disc*, Gulf house magazine.



SERVICE *still beyond the fee!*

When first this chart appeared in print, someone else was saying it... an independent petroleum association. We reproduce the chart, with emphasis on the low cost of cementing, to illustrate Halliburton's concept of service... service above all, service beyond the fee. Last month, an increase in cementing charges went into effect. But it is still the lowest cost service of any on this chart.

"Progress in Service through Research"

HALLIBURTON OIL WELL CEMENTING COMPANY
DUNCAN, OKLAHOMA

The Open Door in the Oil Industry

IT IS NOT necessary to be an octogenarian to recall a time when it was a well nigh universal practice of the oil industry to shroud in mystery the operation of its processing plants and when refinery interiors were held as secret and inviolate as the most sacred religious temple of the Far East. Not only was intrusion unwelcome, but the "No Visitors" sign was reinforced by armed guards, dogs with unpleasant tempers and barricades of barbed wire.

Such precautions seem extreme and unnecessary viewed from this distance and some of them are recalled with jovial comment by men who were in service during the period.

One ruddy cheeked survivor of the early days recalling experiences encountered in this junior employment recounts with a smile the kindly but firm admonition received from his superior, who had noted his association with a chap of about his own years from a competing organization, not to divulge to his friend any information that might reveal operations of his own company. At their age there were so many subjects of greater interest in the world of sports and related activities that the routine activities of their daily work seldom called for any mention, so he had no hesitation in giving the required assurance.

Another veteran who attained to the management of a large refinery before the turn of the century relates with quiet amusement an experience in which he had occasion to visit the plant of another company and was conducted through one section of it until coming to a locked door where he was told, "This is as far as we can take you: the rest of it contains equipment which we are not allowed to show." Some time later he was summoned to a business meeting with the manager of another section of the same refinery and was shown through that portion of it which he had not seen before until reaching the same locked passageway, where he was again told that he could go no further because beyond it lay experimental work which they desired to keep secret. Thus, through a mere coincidence, he had been able to get a full view of the carefully guarded establishment but on neither occasion did he observe anything that could advance his knowledge of the industry.

The revolution that has taken place in this early attitude of suppression has resulted from changed thinking within the industry which in turn has been brought about by the greatest expansion in world energy resources that has occurred during any single span in history. Spurred by the pressure of vast industries demanding new forms of fuels and engines, with an ever-growing dependence upon hydrocarbons, the responsibility for leadership in this field of development literally has been forced upon the men of petroleum.

As the companies extended their studies and experiments in processing methods and equipment, they found it worth while to set up separate divisions or affiliated companies to license the use of these rights once their validity was legally established. Income from this source has risen to hundreds of millions of dollars in the case of the more widely applicable of these inventions. The rate of progress in adding new ideas and devices, new economics of operation and new products to the petroleum groups has exceeded that of any other single industry.

Most important in its economic effect not merely upon petroleum and its related activities, but on industrial life in general, is the transformation that has taken place in the dissemination of public knowledge regarding its operations. With protection established for the property rights represented by inventions and improvements, there is no longer any inducement to restrict the spread of such knowledge.

Year by year the industry's circles of activity broaden, the number of products continues to grow, the capital investment in research to develop more efficient methods of operation is increased, more additions are made to its thousands of products and more concentration is centered upon research to extend still further the boundaries of the industry's activities. No longer is there need for secrecy, once a process is developed to the commercial stage. Instead there is reason under proper safeguards, to invite the whole world in to see and hear of each new development. The gain to individual companies, to the industry itself and to the entire economy from this policy of the wide open door is of immeasurable benefit to the economic progress of all mankind.

WELCOME TO SAN FRANCISCO

By T. S. Petersen*
**President, Standard Oil Company of California.*

ON November 3, 1941, the 22nd Annual Meeting of the American Petroleum Institute convened in San Francisco. The report of this meeting leaves little doubt that the gathering occurred during troubled times. The general tenor of the five day meeting was one of preparation for all-out war effort. And the theme proved timely. It was just one month after the close of the meeting that Pearl Harbor was bombed.

Now, 14 years later, San Francisco will again be host to the API at the 35th Annual Meeting. The world situation is pleasantly different. There is a degree of world tension, but our future as a whole is perhaps the brightest it has been in generations.

As an indication of our capabilities, consider merely the achievements of the nation's petroleum industry since that San Francisco meeting in 1941.

At that time, the paramount problem was one of fueling and lubricating a nation at war. Admiral Nimitz was to say that winning was a matter of "beans, bullets and oil," and later to change his statement to "*oil*, bullets and beans."

And he was right. During World War II, twice as many tons of oil and petroleum products were shipped overseas as the combined total of all other types of cargo, including troops.

When the war ended, the American petroleum industry smoothly and efficiently turned back again to peacetime production. It found itself faced with a tremendous petroleum appetite induced by a burgeoning national economy.

Satisfying the peacetime petroleum requirements of the country has proved no less challenging to the oil industry than meeting war demands. As every oilman knows, total annual domestic demand for petroleum products has increased more than 60 percent since 1945.

But volume has not been the industry's only long suit. Technological development has been another. Since V-J day the field of petrochemicals has blossomed with new products and new uses for old ones. More and better uses have been found for certain crude fractions until today almost 100 percent of the raw petroleum is now processed and marketed. Recovery of oil from its natural underground vaults has become an even more orderly and efficient process.

On the basis of this past performance, I believe we can look to the future with a full measure of confidence. The Census Bureau has predicted a U.S. population in excess of 190,000,000 by 1975. At least one fourth more automobiles will be on the highways and truck traffic is expected to almost double.

Such figures, quite obviously, presage a continuing increase in demand for petroleum products. It will be a big order. Yet, percentage wise, the nation's oilmen have filled far bigger ones.

Yes, satisfying the petroleum needs of the peacetime future is a big job. But it is a welcome challenge to a fast-growing industry which, to my way of thinking, has only begun to find its potential.

San Francisco and the entire California oil industry are privileged to welcome the American Petroleum Institute, the American oilmen who will play such an important part in meeting this challenge successfully.

A UNIFIED PETROLEUM INDUSTRY

By Frank Porter

THROUGHOUT its history, the domestic petroleum industry has had its share of problems. They are with us now, even as they have been through the past. Perhaps, because we are living with them, our current problems—*our* problems—may seem to transcend all others in size and significance. Whether this appraisal is right or wrong is a secondary consideration. The primary one is that these problems must be resolved by us here and now, and the decisions that are made must be sound and prudent, for they will become the milestones or the millstones of the future.

Faced as we are with strident internal and external pressures, it seems to me that the paramount need of the moment is a unified industry—a unified industry with a positive philosophy. We must never allow ourselves to forget that competition of the most vigorous kind forms the climate in which the oil industry operates—from production through to the final sale to the consumer. Any change in this philosophy, or any attempt to regulate one link in the competitive chain, only weakens the whole structure. If such should occur, necessity will make other changes mandatory, and complete regulation of the entire industry will follow inevitably and swiftly. Competition will be throttled, and our livelihoods will be jeopardized, whether we be producers, refiners, transporters or marketers, or any other participant in petroleum's vast operations.

In the competitive system, the relationship of supply and demand is not always constant—nor are price relationships always constant. At any given moment, the supply and price relationships between raw materials, refined products, and consumer deliveries may be out of adjustment.

The important thing to remember, however, is that private enterprise—operating in a free market—has demonstrated that it can bring about an adjustment in these relationships more efficiently, effectively, and satisfactorily than any other method ever tried by mankind.

In the long swing, the profit incentive—step by step along the entire stream of oil from the well to the consumer—brings supply and price into reasonable relationship.

As adjustments are achieved, of course, some problems are laid to rest—even though others appear to be perennial. Yet, despite all the difficulties of the past, there has emerged a stable and effective industry. We have an industry with a record of service and achievement second to no other.

Unfortunately, the economic process that brings about these adjustments is often slow and therefore brings irritation. At such times the air is likely to be filled with complaints; not infrequently, when nerves become ragged, there may even be an exchange of uncomplimentary epithets and threats of reprisal.

It is peculiarly human that calling the other fellow names seems to give relief and, oddly enough, seems to fortify one's own feeling of rightness. All of us are given to saving face. When we are frustrated, we are likely to believe that the other fellow is getting all the good breaks.

Inevitably, these irritations and frictions crop up not only between different companies and individuals but also between different branches of the industry.

Looked at philosophically, not as a lawyer defines it, the oil industry is an integrated operation beginning with the search for raw material and ending with delivery of finished products to the consumer. Whatever our individual endeavors may be, we are all of us in the oil business together.

Not one of us as an individual—not one of us as a functional group—is capable of operating effectively without the others. We are all interdependent. But, because the oil industry has grown to be of such enormous size and has

become so highly specialized in its varied operations, the component parts of the industry tend to become autonomous and isolated in their thinking. And there lies the danger.

It's only a few years back that I was devoting all my attention to the drilling and production end and didn't have too much contact with the other branches of the oil industry. In those days, I thought that the drillers and producers were the only people in the oil business with problems. Everything in the refining, transporting, and marketing end of the business seemed peaceful and quiet.

In later years, as my work brought me into more intimate contact with the industry as a whole, I was surprised to find that other branches of our business thought that only they had problems—in fact, they seemed to envy the drillers and producers.

I wonder how many of you realize, for example, that not too many years ago the independent oil producers of this country were pushing a program to get the integrated oil companies to segregate their earnings to show which departments were operating at a loss—and which at a profit.

Do you want to know why they wanted company earnings so segregated? It's simply this: The independent producers claimed they were at a competitive disadvantage in the crude oil markets because the integrated companies were subsidizing their production departments out of profits made from other company activities, including marketing.

We know that independent marketers, on the other hand, feel that the integrated oil companies subsidize their marketing operations out of profits from production. This is not the place to resolve that argument. I do know, however, that some of the large—and profitable—companies buy more of the crude oil run through their refineries than they produce themselves.

Some think that when this alleged subsidizing takes place, the functions should be divorced from one another by legislation. I sincerely believe such a view is shortsighted. Let me give you two simple examples of where this reasoning might lead if it is adopted. Both illustrations are in the marketing end of the business.

Let us assume the case where someone is operating two service stations, one of which makes more money than the other. Some competitor could claim profits from the more prosperous service station and being used to subsidize the other service station and, if the theory of divorcement is logical, could go to the extent of demanding divorcement of the more prosperous station from the less prosperous station. I think you will agree that such reasoning doesn't make sense.

Let me give you another illustration involving a single service station. If the retail tire stores should claim that service stations selling tires subsidize the tire operation by profits from the gasoline end of their business, would any of you be able to disprove such a claim to the satisfaction of a legislature which thought that the tire store had unfair competition from the service station operator? If it is logical to divorce production from refining or refining from marketing, would it not be just as logical to divorce the tire business from the service station operator?

There are other important reasons why I think the whole idea of divorcement is fallacious, but I point out these simple examples to show that divorcement may look like a cure-all but anyone who will take the time to think the idea through carefully will find that it isn't. I doubt that you would want such theories carried to their logical conclusion in your own segments of the business.

So let's all of us in the oil industry try to avoid falling victim to fallacious thinking and let's guard against losing sight of our interdependence on one another.

To use a rather homely and trite analogy, I would say that the various individuals and segments comprising the oil industry might profit from the tradition of the American family. Members of the family reserve the right to criticize and belittle one another yet defend one another, to the last breath, against unjust criticism and disparagement by an outsider.

All of us, however, think most highly of that family whose members are not only loyal to one another against outside attack but also live in an atmosphere of internal peace and mutual respect.

We in the oil industry are no less interdependent on one another. Can we afford to overlook the fact that any outside attack on any segment of the oil industry is an attack on the industry as a whole? I say we cannot! Otherwise, we cannot afford to be optimistic about the future of the oil business. It is gratifying to me that most oil men in all walks of the industry are more and more strongly coming to the same conclusion.

Where Congress is concerned, the industry certainly can have no valid objection to legitimate investigations of its operations. I have found that responsible oil men are always more than willing to cooperate with any governmental inquiry honestly dedicated to finding the facts.

Fortunately, in most cases, the U. S. Congress is made up of men and women of superior intellect and high patriotic devotion. Let them be guided by the facts, and follow their own sound judgment and the atmosphere for a continued healthy, growing oil industry will be preserved in this country.

But if the Congress should start legislative tinkering with the function of a competitive and dynamic industry like the oil industry, the inevitable result will be confusion followed by various degrees of chaotic condition. The public, as well as the industry, will eventually suffer.

The retailer, the wholesaler, the refiner, the producer, and all other segments of the industry should stand together and be united in their determination that any legislation is vicious which is prepared in the belief that the various segments of this industry cannot live and work together without legislative help.

Such laws should be resisted strenuously by our entire industry despite any "do-good" motives on the part of those proposing the legislation and despite any wishful thinking that it will ease frictions. Legislation of this kind, at the expense of principle, is always dangerous.

Quite unsuccessfully, I have tried to find some new and effective way to say: If the industry remains united, there is a good chance that it will stand—but, divided, it may well fall. But perhaps this is a case where saying it the old way is best.

OIIC SCHOOL PROGRAM

may reach 10,000 schools this winter

With the appointment of a top-level educator to the staff to supervise its accelerating activities, the School Program inaugurated so cautiously by the American Petroleum Institute five years ago currently is undergoing a vast expansion in scope and dimensions.

Goal for the stepped-up 1955-56 term is 10,000 schools. That is an increase of slightly more than 60 per cent over last spring's peak figure of 6,243 schools. If the goal is achieved—and there are no major obstacles in the path right now—the API School Program will be ensconced in one-third of the nation's secondary schools come springtime.

The new educational director is Dr. Herbert R. Jensen, a leading authority on audio-visual education. His appointment became effective September 1, at the beginning of the new school term, and ended a long search by the Institute for the right man to head up this fast-moving program.

Dr. Jensen was professor of education and director of the Instructional Materials Center at Colorado State College of Education prior to his affiliation with API. He also was former Survey Director for the National Research Council's Committee on Scientific Aids to Learning, and former Director of Research for National Educational Films in New York. During the war years, he served as visual education consultant for the Navy, with the rank of lieutenant commander.

Dr. Jensen will work under H. B. Miller, director of the Institute's Department of Information, and Executive Director of the Oil Industry Information Committee, the nation-wide public relations program sponsored by oil men and oil companies alike.

That his duties right from the start will be somewhat on the feverish side is putting it mildly. The 60 per cent increase in the number of schools represents a tremendous assignment in itself. In addition, as new schools are added, more materials must be prepared. In the 1954-55 term, the program saw distribution of more than 2,000,000 supplemental booklets, and other pieces of educational material. The 1955-56 target envisages use of perhaps 4,000,000 or more pieces of literature by springtime.

Objective of the school program is to make young Americans aware of the details of one of their greatest industries, and the competitive system of free enterprise, and private management which makes it all possible. Auxiliary objectives include similar support from educators, and better understanding of the scholastic world by oil men.

Dr. Herbert R. Jensen

First come the local committees of oil men. They are briefed on the program and the materials.

The materials that are provided to the schools are not textbooks in themselves. They are supplemental booklets, designed to fit into physics, chemistry, economics and other classroom activities. They are brought up-to-date constantly, so that they are literally miles ahead of the standard textbooks normally used by students.

Thus, the junior and senior high school pupils not only get a better picture and a better understanding of the complex oil business, but one that is modern in every respect, and keeps almost abreast of the many developments in the rapidly-changing petroleum world.

Student materials not only provide the youngsters with written material, but also slides and motion pictures, charts and posters. Guidebooks and handbooks are made available to the instructors so that they too can get the maximum benefit from the materials.

All of the materials used in the program have been reviewed and endorsed by many of the country's foremost educators. That, more than anything else, probably accounts for the outstanding success of the program. The advice and counsel of educators was sought from the very beginning, and the materials were tailored to meet the educator's concept of what was needed, rather than the oil man's idea of what the student should have.

Each and every booklet was cross-checked with varied educational and industrial experts, to make them as authoritative as possible. During the earlier years of the program, the trial and error method also brought about revisions and amendments. Now it can be said that the program is rolling into high gear, with a clear field ahead.

Future plans are still to be crystalized, but many members of the Oil Industry Information Committee look optimistically to the day when the program and the materials will be available to, and in use, in virtually every secondary school in the country.

The operations of the program are still controlled closely, lest they get out of hand completely. For example, the program has never been offered from a central office on a mass basis. Nor is it advertised in teacher publications. There is always the fear that it might be overwhelmed by an avalanche of requests.

To make the role of the local oil man paramount, the program is always introduced on a community level by local oil men—whether they be producers, refiners, transporters, marketers or any other participant in the industry's operations.

These oil men form committees, under OIIC sponsorship, and it is their task to contact the school boards and officials. This, of course, brings about mutual understanding from the start between teachers and oil men, in both their objectives and their common problems.

Any school in the country can ask for the materials, if it so desires. But it would not be considered part of the program until local oil men and school officials had negotiated an understanding. To help inquiring schools make their decisions, sample kits of materials are supplied by District OIIC offices, upon request.

In addition to the classroom activities, the local oil men also arrange for outside events to enhance the student's understanding of petroleum. Where feasible, trips to industry facilities are arranged, and special displays and conferences or discussions are used to their best advantage.

The big boom in the School Program activities was undertaken just in advance of this year's Oil Progress Week. This was the eighth annual observance of this week-long parade of speeches, open houses, rallies, etc., and, in keeping with the ratio of growth, the 1955 festivities were the biggest and best of all. There were so many special events taking place during Oil Progress Week that is required 16 pages of single-spaced copy just to enumerate the principal ones.

Probably the biggest affair of all was the API's first adventure in television. On October 9, the first day of Oil Progress Week, the Institute—on behalf of the industry and the thousands of local Oil Industry Information Committees—sponsored a television look into the future—into the kind of life that the American people will be living in 1976, on the 200th anniversary of the Republic.

It was a fascinating panorama of the things to come—wall-size television screens, high-speed motor vehicles (with gas turbine engines) piloted automatically on radar-controlled highways, cities without traffic or parking problems, atomically-sterilized foods and 30-second meals, shopping by remote control, air-conditioned clothes, pocket walkie-talkies, wrist-watch radios, "bubble" houses with outdoor-indoor living rooms, wireless helium-filled floating lamps, laundry machines that wash, dry and iron clothes in minutes. . . .

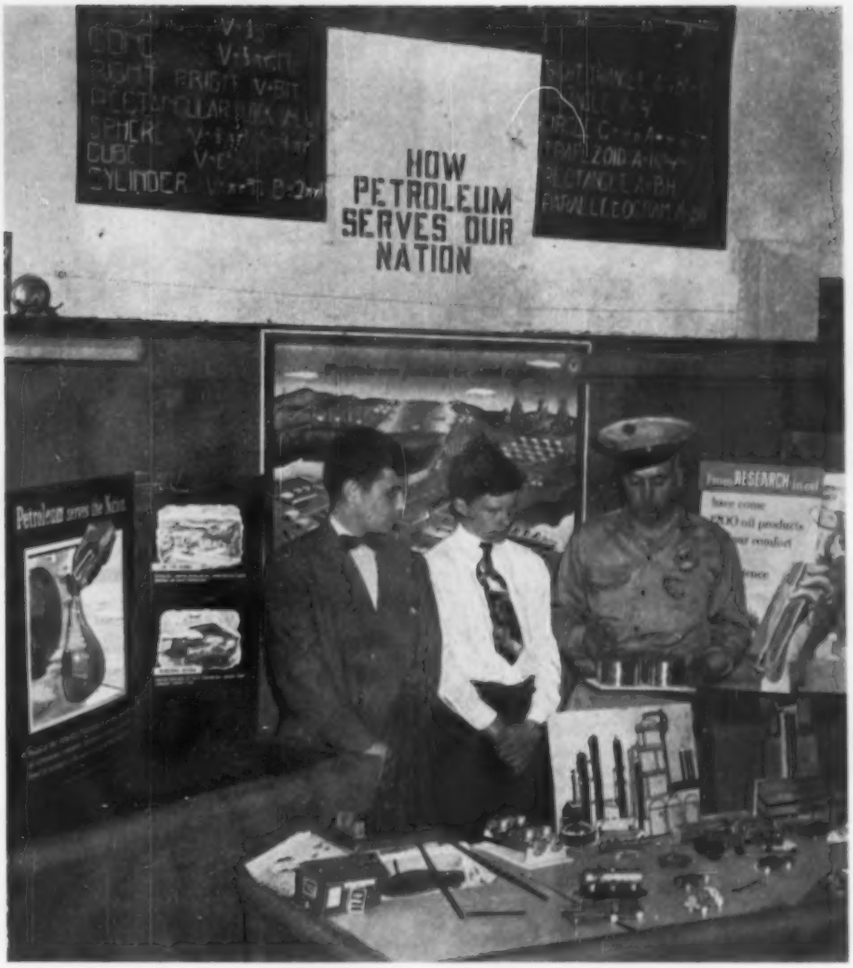
These were only a few of the many marvels of science and wonders of comfort that were projected. All were based on realistic possibilities, so that the television show itself was as authentic as men could devise. Close to 170 television stations on a National Broadcasting Company hook-up carried the program, opening the door to a potential audience in excess of 100 million persons.

Participating in the show, in addition to the stars of television, were Fleet Admiral Chester W. Nimitz, wartime commander of the U.S. Pacific Fleet, and poet Carl Sandburg. Specific theme of the hour-long program was to emphasize over and again the wonders of freedom and free enterprise—what men and science can do in an atmosphere of freedom. It noted that the oil industry itself typified this role of enterprise, progress, and service.

Still another outstanding feature of Oil Progress Week, 1955, was public release of the Institute's new motion picture, "Barrel Number One." This is an educational film

Next are conferences with school officials and school department heads. Here the materials are explained in detail.

Individual conferences with teachers also amplify the materials, and how to get the maximum benefit from them.



Special displays also help round out the students' understanding of petroleum.

Teachers and students alike use the booklets and other materials in the classrooms.

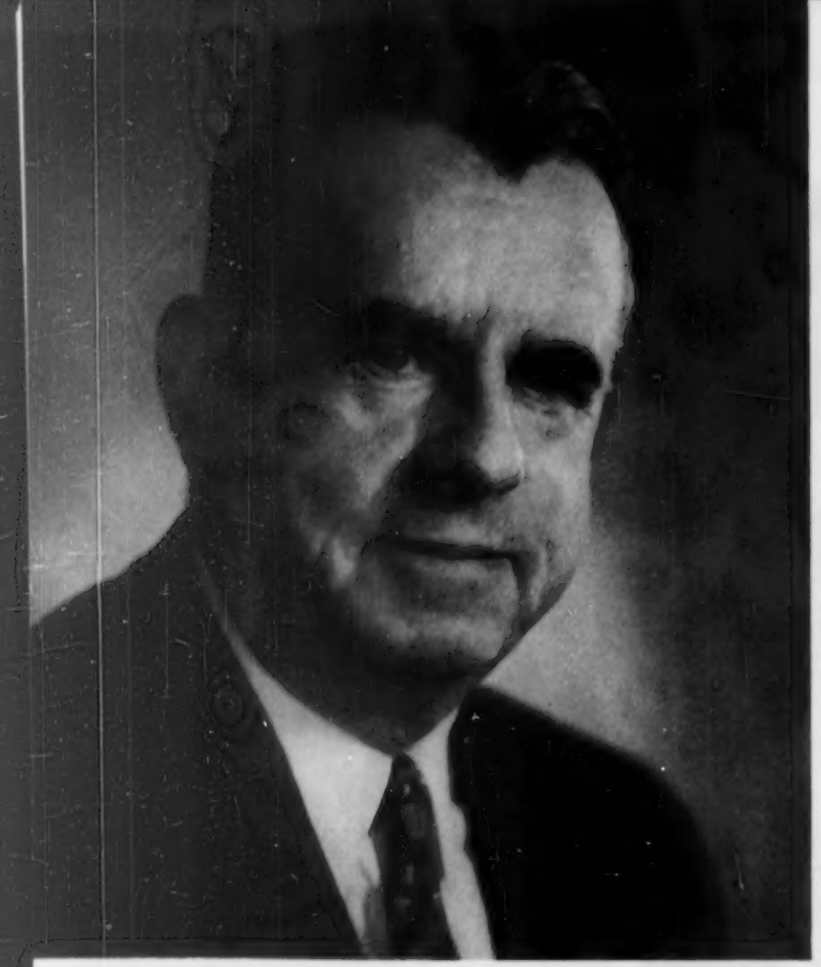
on the industry's operations—how oil is explored for, discovered, produced, transported, refined, and consumed. As the title indicates, it tells the story of the first barrel of oil from a new well, and traces that barrel through the industry's complex maze to the consumer's door.

More dealers than ever participated in the 1955 observance. No less than 105 communities put on an up-to-date version of the "Lucky Neighbor" program, in which customers were given numbered folders and drawings were held at the end of the week to award prizes. The latter ranged all the way from baskets of groceries to all-expense trips to such resort places as Bermuda. It was estimated that 3,000,000 "Lucky Neighbor" folders were distributed during Oil Progress Week by more than 13,000 dealers. The total number of dealers was twice that of last year, and the number of communities in which the program was carried out was four times that of 1954.

Many of the industry's "top brass" took to the stump again too, to extol the virtues of petroleum and petroleum progress. These included F. W. Abrams, former chairman of the board of Standard Oil Company (New Jersey); Fred H. Meeder, president of Richfield Oil Co.; Stanley C. Hope, president of Esso Standard Oil Co.; Henderson Supplee, president of Atlantic Refining Co.; H. S. M. Burns, president of Shell Oil Co.; Dr. Robert E. Wilson, chairman of the board of Standard Oil Company (Indiana); S. B. Ireland, president of Cities Service Oil Co.; J. E. Dyer, president of Sinclair Refining Co.; D. T. Staples, president of Tide Water Associated Oil Co.; and R. L. Minckler, president of General Petroleum Corp.

In all, it could be said that Oil Progress Week, 1955, reached more people and probably made more impact than any other observance of its kind by any other industry.

Special trips to oil installations provide specific information for the students.



L. E. Fitzjarrald, chairman of the API Central Committee on Training, is manager of the production department of Phillips Petroleum Co., Bartlesville, Okla.

A. W. Thompson, API vice president for production, was formerly president for two years of the American Association of Oil Well Drilling Contractors.

Skill of production workers aided by API TRAINING PROGRAM

T. A. Atkinson, Douglas Oil Co. of California, Los Angeles, is chairman of the API Committee on Vocational Training.

THE AMERICAN Petroleum Institute Division of Production is expanding its activities in the field of employee education at several levels. Previously centered on the training of field workers and foremen, the educational program now has been expanded to the management level by the establishment of an intensive 7-week course for executives and junior executives.

Since vocational training for field workers first was undertaken a dozen years ago more than 80,000 individuals have received instruction in oil industry skills. Ten years ago the American Association of Oil Well Drilling Contractors joined the movement and since that time the contractors have actively co-operated with division and district API committees in sponsoring educational opportunities for field men who are interested in improving their positions in the industry.

Universities and colleges in the oil producing areas have been enthusiastic supporters of the API-AAODC program from the outset. Extension departments have aided in the development of texts and have supplied skilled teachers to aid in instruction.

An example of school-industry cooperation is seen in the first session of The School of Production Technology which opened at Kilgore College in the center of the East Texas field on October 3 and will complete on Nov. 17 a 7-week presentation of four units of instruction covering a wide range of information for non-technical field supervisors and prospective supervisors.

Development of the School of Production Technology was authorized a year ago at the annual API meeting at Chicago following the successful session of a drilling technology school at Odessa, Texas. The Petroleum Extension Service of the University of Texas with the assistance of an API advisory committee of 20 oil men and educators and a group of sub-committees with a membership of upwards of 30 by the middle of the year had spent hundreds of hours in preparing a course of study and arranging a resident training center.

Sessions of the school are being held on the campus of Kilgore College which provides facilities among the most modern and complete in the entire United States. Since the college is located in the center of the East Texas field those attending the school are afforded opportunities of visiting installations covering a wide range of conditions. Nearby are recently discovered prolific oil, gas and condensate fields as well as older fields where secondary recovery projects are being carried out. Oil companies agreed to permit the use of their properties for special demonstrations and field trips.

Attendance at the School of Technology is not a fall vacation for those selected to attend. The students put in a full seven-hour day in classes which must be supplemented by added hours of "home work."

Although designed as a technical course the first week the school is given over entirely to a study of industrial and public relations. Supervisors are briefed on the relationship of the industry to the federal government, state governments and local authorities. Federal and state controls on commerce and on drilling, unitization and field practices generally are studied.

In the study of public relations the supervisors are briefed on how to increase and maintain good relations with other oil companies, with land owners on which properties are located and with people in the community generally.

Fundamentals of supervision are taught. The management function, technique of leadership and how to handle personnel problems are among the topics in the first week of the course.

The second and third weeks of the school become more technical and consist of a presentation of an intensive study of geology and geophysics, reservoir mechanics and field development. After studying how and where oil accumulates and the elements of prospecting the supervisors are given a course in reservoir mechanics. They are briefed on reservoir fluids, types of drives, steps which must be taken to plan the exploitation of a reservoir once it is discovered and the principles which must underlie an effective drilling program.

Fourth and fifth weeks are being devoted to production and processing methods of both oil and gas and curriculum for the final weeks was planned to study production maintenance. In this category the supervisors were to study the installation and operation of artificial lift, well service operations, workovers, pressure maintenance, water flooding and salt water disposal.

The School of Petroleum Technology was not the only new enterprise undertaken recently. Late in 1954 courses were begun for field men in the care and uses of sucker rods, care and use of wire rope and the principles of rotary drilling fluid. A course on lubrication of field equipment is in course of preparation. Third draft of a manual has been reviewed, revised and made ready for publication. Experimental classes have been conducted and an abbreviated version is planned for presentation at this month's meeting at San Francisco leading to final validation. The steps outlined above are typical of the careful and painstaking manner in which field courses are developed before being approved.

Other new courses in process include one on control of vapors and oil gravities in

A demonstration of the effects of the importance of wire lines on the distribution of weight on the derrick and the traveling block.

the production of crude oil and on water flooding. First draft of the vapor control manual was reviewed last May and experimental courses conducted in Oklahoma and Texas preliminary to validation. Outline of the water flooding manual has been drawn up and the committee now is accumulating basic manual material.

New films have been developed as training aids. Two such validated at the mid-year meeting of the Central Committee on Training last June dealt with **Radioactive** Well Logging and Hydraulic Formation Fracturing. In both cases the films were reviewed by committees of more than 50 experts in each field representing all parts of the country before validation. Once approved, prints were prepared and stocked at the Dallas offices of the API production division for loan.

A new manual dealing with corrosion now is being developed jointly by the API and the National Association of Corrosion Engineers. This is expected to be completed before the end of this year.

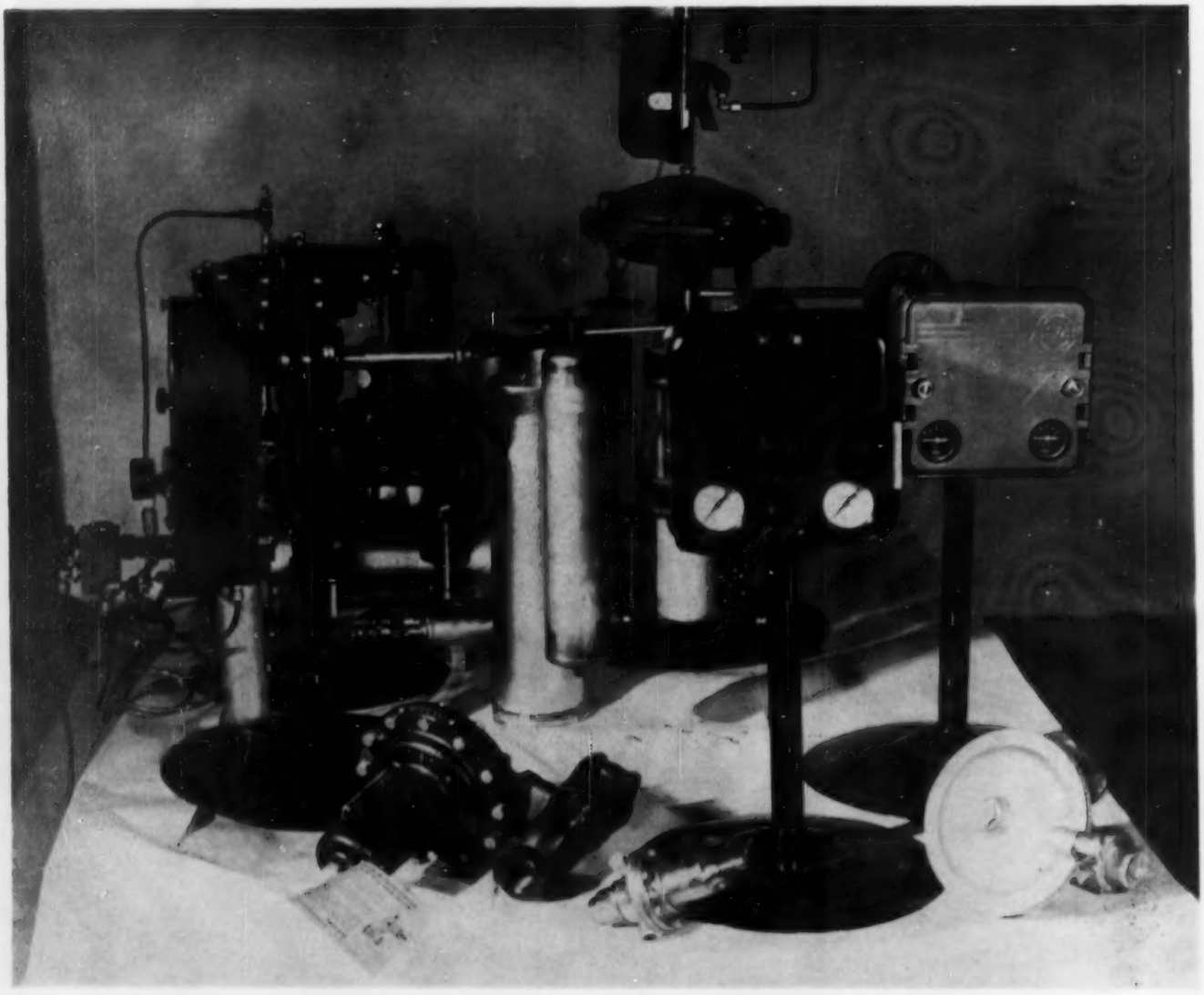
In addition to films the API has developed training kits which are available on loan in connection with a number of courses. These are particularly desirable since under the API-AAODC program the school is taken to the oil worker—not the oil worker to the school.

In general, any supervisor or contractor who desires to have a particular course or courses taught in his own field or locality and who can assure the attendance of at least a certain number of his employees, can initiate arrangements through the vocational training department of his state that will result in the arrival, on a mutually-agreed-to date, of a qualified instructor with equipment.

Courses can be taught night or day, in public school or junior college buildings, in warehouses, public halls or company meeting rooms. Costs to companies and students vary according to state policy, length of the course, and company policy with respect to reimbursing enrollment fees. Again generalizing, each company or group of companies desiring a particular course in a particular area will pledge a certain flat sum to the state agency. Students will be charged an enrollment fee, usually nominal, to cover the cost of supplies and textbook. The fees paid by companies and students usually constitute only about one-third to one-half of the actual cost of transporting and maintaining instructor and equipment. The balance is made up from state and federal vocational training appropriations.

Courses are taught to oil-field workers

Miniature working model used in connection with the course on "Field Handling of Natural Gas".



by professional instructors engaged by the state departments of vocational training. This arrangement combines the practical knowledge of the industry with the specialized skills of professional instructors available from state agencies.

Through these means, there is made available to the oil-field worker concentrated and accurate information from which he can acquire new and improve old skills, and thus become more proficient at the job he holds or at one which he may later hold.

These cooperative efforts of the oil producing companies also permit the formulation and teaching of training courses at a much lower cost than would be incurred by any company in creating and assigning, on its own account, the instructional material, training aids, and skilled instruction which are the elements of any given API-AAODC validated course. As an exception to this, it is noted that any company desiring to incorporate such training material in its individual company program, without the services of a state instructor, can freely obtain the necessary tests, teacher's guides, motion pictures, and slide films; also blueprints and bills of material on all demonstration equipment from either the association office or the formulating agency concerned.

One of the very early courses was that dealing with the principles of drilling mud control which is an API-AAODC jointly sponsored project. It was inaugurated in 1946 when drilling mud was becoming a pressing problem.

The treatment of drilling mud was becoming more complex and, as more and more products came onto the market, the chemistry of controlling drilling muds advanced beyond the knowledge of the average field man. Although the mud schools were not designed to give the roughneck the knowledge of the mud engineer, he began to learn the chemistry and use of additives. They learned the necessity of running constant field tests on density and mud weights, viscosity and gel properties, acidity and alkalinity, and they learned to control those properties so that fewer and fewer mud problems developed.

Although the course on drilling mud control is ten years old this year it is still very much alive. It put 300 to 400 men trained in drilling mud control into the oil industry each year. More than 8,000 men have participated in the course. This is almost enough men to supply a trained man for every tour on every rotary rig in the U.S. today.

The drilling mud control course requires

Study on the design of a rod string during the presentation of the sucker rods course.

25 to 30 hours of time. It usually is conducted over a period of two weeks with classes running two and a half to three hours per day. After a daily lecture the students spend the remainder of the period in testing the physical and chemical properties of various muds, interpreting data obtained and applying remedial treatments to the muds tested.

The text employed has gone through ten editions and the 11th is now in course of preparation. Thus far 22,000 manuals have been printed. The number is second only to the "Primer of Oil and Gas Production" which has sold 30,000 copies.

In Texas the course costs $10 per man enrolled. In other states where a Texas teacher is desired the costs involve payment of the teacher's salary and expenses, plus the moderate fees for books and laboratory equipment breakage.

The API organization consists of Wm. H. Strang, director of the division of production, J. F. Smith, training administrator and his staff, plus a large number of active committee men among the oil companies and drilling contractors. Overall API committee is the Central Committee on Training under the chairmanship of L. E. Fitzjarrald, Phillips Petroleum Co. Working with the central committee is the National Committee on Vocational Training headed by T. A. Atkinson, Douglas Oil Co. of Calif., which has the assistance of five district committees. Head of the Eastern District committee is E. J. Reading; Rocky Mountain District, H. C. Walker; Pacific Coast, H. D. Aggers; Mid-Continent, R. H. Smith; and Southwestern, L. L. McDonald. Specialized sub-committees are organized year after year to develop new courses and other projects. At the recent mid-year meeting Mr. Atkinson reported that enrollees in API courses for the period of June 1, 1954 to May 31, 1955 was 4,593; enrollment in non-API courses (Pacific Coast District) was 904. The total enrollment in API specialized training courses since June 1, 1946 was 15,561.

The number of API specialized courses and training aids kits now available for use by the industry is as follows: "Treating Oil Field Emulsions," "Field Handling of Natural Gas," "Care and Operation of Pumping Engines and Units," "Care and Use of Sucker Rods," "Handling and Running Casing," "Care and Handling of Sucker Rod Pumps," "Care and Use of Wire Rope."

Courses in the process of formulation and to be validated in 1955 or 56 are as follows: "Lubrication," "Control of Vapors and Oil Gravities in the Production of Crude Oil," "Water Flooding."

A special subcommittee was appointed with Hugo Riecken as chairman, to give

Introducing a new course soon to be validated entitled "Control of Vapors and Oil Gravities in the Production of Crude Oil".

further consideration to either the possibility of adapting API material to correspondence study, or to take advantage of existing courses of offers from correspondence schools to prepare courses for the industry. The committee believed that API should encourage correspondence schools to adapt existing API courses to correspondence studies, but it would be beyond the realm of practicability for the API training committees to examine and validate existing correspondence school courses.

It was reported that cumulative enrollment in API specialized training courses at mid-year had reached 15,561 divided as follows among the various fields: Alabama 124, Arkansas 127, California 593, Colorado 327, Illinois 307, Kansas 1,387, Louisiana 535, Mississippi 37, Montana 32, Nebraska 44, New Mexico 361, Oklahoma 1,567, Texas 8,870, Utah 31, Wyoming 591 and Canada 609.

At the recent annual meeting of the American Association of Oil Well Drilling Contractors which co-operates with the API in a number of courses, Richard L. Dailey of the University of Texas, reviewed the past 10 years of training activity.

He began with the drilling mud course begun in 1946 and spoke of subsequent introductions such as Accident Prevention, Management Institutes, Supervisory Training, Drilling Practices and Drilling Engines. This latter course ran for six solid months at Odessa, Texas.

In 1951 a whole new series of courses emerged when the Petroleum Extension Service of The Division of Extension, the University of Texas, conceived the idea of producing films pertaining to operation around a modern rotary drilling rig and building a three-hour short course around the film, Mr. Dailey reported. The cost of producing the film on "Handling and Running Casing" was financed from part of the proceeds taken in through enrollment. The Association hired the film to be shown to groups of petroleum engineers in colleges and universities throughout the petroleum producing states for the purpose of getting the graduate petroleum engineer to consider a career in the oil well contracting business. Out of the 7,000 people who have attended this course to date, approximately 500 were college students. Subsequently, the Association has participated in or co-sponsored films on "Rotary Drilling Fluids," "Care and Handling of Drill Pipe," three supervisory training films, and eight well completion films. Each of these films has been or will become an integral part of a three-hour course.

In 1951 the idea of "Primers" for the layman arose. The first primer was the "Primer of Oil Well Drilling" followed by "Primer on Well Service and Workover." All totaled, a little more than 100,000 manuals and primers bearing the association's name have been sold to people around the world.

One year ago the School of Drilling Technology opened its doors. This AAODC sponsored school is said to be one of the most comprehensive training courses yet offered to the drilling contractor. It embodies some of all of the courses that have been offered singly heretofore; from Management Institutes to the Casing Course and many more additional subjects. Totaling 19 subjects in all, it also includes discussions concerning the newest procedures and equipment used in drilling today.

Roanoke, Va. oilmen conducting Roanoke high school pupils through large trailer filled with a great variety of materials derived from petroleum. Trailer exhibit was moved from school to school during Oil Progress Week.

People from all over the world are taking advantage of the training, including Arabia, Germany, the Netherlands, Chile, Venezuela, Alberta, Canada, and almost every active oil producing area in the United States.

The object of the school is to train the key men of the oil industry and specifically those of the drilling contractor. The words "key men" signifies those men who have already gained considerable rig experience and whom the drilling contractor has in mind to develop into permanent personnel and keep within his organization. This calls for men who are loyal and who have the ability and integrity to succeed and develop as the organization grows. Anyone from a contracting firm without these qualifications would be quickly left behind because the subject matter is condensed and given in rapid fire sequence.

It is a practical course. The instructors have had a great deal of field experience and are specialists in their subjects. They come from the drilling contractor's organizations, colleges and universities, major oil companies, and supply and service organizations. Where possible, field trips are made to observe new and interesting operations. To make the course more practical, open sessions are used to question the enrollees on how the curriculum can best be changed to suit their working needs. Upon the request of the men in the last term of the school, the subject "Air, Gas, and Slim Hole Drilling" has been added to the curriculum. The instructors are constantly evaluated by the group to see that the best men are obtained to conduct the subjects.

Summarizing AAODC activity Mr. Dailey reported that over 25,000 men have attended the courses and have amassed a little less than 300,000 student hours.

A spark plug in the vocational training program in both the API and the AAODC is A. W. Thompson, president of A. W. Thompson, Inc., Houston drilling contractor. Mr. Thompson was president of the American Association of Oil Well Drilling Contractors in 1951 and 1952 during the period of expansion in the education as outlined above in Mr. Dailey's recent report. During the past year he has been vice president for production of the API and has carried his enthusiasm for vocational training over into his API administration. As mentioned previously Mr. Fitzjarrald as chairman of the Central Committee on Training and Mr. Atkinson, head of the Vocational Training Committee, have been indefatigable workers in developing courses and promoting utilization of present educational facilities.

William F. Kirk, manager of the economics department of General Petroleum Corp. has been with that company continuously since his graduation from Oregon State College in 1929. Only exception which may be noted is that he was on military leave for four years during World War II. As a major in the U.S. Army he won the commendation award.

Mr. Kirk spent ten years in the comptrollers department and three years as executive department statistician before the outbreak of the war. On his return from military service he was assigned to the economics department which he now heads. Two years ago he was called on for another tour of duty in the service of his country, this time as assistant director of the program division of the Petroleum Administration for Defense.

By William F. Kirk

Petroleum supply and demand in the

IN studying the petroleum supply and demand of the Pacific Coast area, one needs to remember the uniquely essential role of petroleum in this area. In the nation as a whole, the products of our industry—oil and natural gas—provide about 67 per cent of the energy used by the people. On the Pacific Coast, more than 90 percent of the energy used comes from oil and gas. In other parts of the country, industrial and commercial plants using large volumes of oil can convert to coal usage without severe economic penalty, but that is not the case here because cheap coal supplies are not available. Hydroelectric power is important but limited. It is a fact that the continued growth of industrial activity in the West is dependent upon adequate supplies of oil and natural gas.

Some historical facts of great importance to the oil business of the Pacific Coast are the relative newness of the country, the rapid growth of population, and the character of the people who have moved to the West.

The newness of the country has resulted in an economy based on motor transportation—automobiles and trucks. In the five western states 11 per cent of the nation's population own 14 per cent of all the motor vehicles in the United States. Public transportation systems for the movement of people are of small importance, and there is a distinct lack of rail line networks for freight movement, so characteristic of older parts of the country.

Migration of people to the West—probably the greatest movement in the history of the world—is a well-known historical fact. In every decade since 1900, the percentage of U. S. population residing in the Pacific Coast area has increased. Since 1940, population here has increased an estimated 76 per cent, three times the rate for the country as a whole.

Not so commonly known is the character of the people moving to the West. The past has witnessed several waves of migration of vastly different kinds. From 1910 to 1935, migration was comprised mostly of small-town midwesterners of middle-age or older, but in good financial condition. From 1935 to 1940 came the Dust Bowl migration, of all ages and in poor financial condition. Since World War II, there has been the greatest migration of all from everywhere. These are the GI's who were trained for their war jobs in the West, and who, when the war was over, returned to the West. These are the ones, young, well-educated, aggressive, and with big families, who have changed the character of our people.

With a change in the character of the people has come a change in the character of business in the West and business leadership has been equal to the challenge which the new migration placed before them. In parts of the West, especially California, industrial economies of great size have been established. Never in history has there been such an investment in capital goods as in the West during the last 10 years. As a result, income per family in the Pacific Coast area, which was $600 above the U. S. average in 1940, is now approximately $1,000 above the average of all U. S. families.

Historically, the Pacific Coast area has been self-sufficient in petroleum. For many years, California's crude oil, refineries, and transportation facilities have supplied the domestic demands in this area, plus the Pacific foreign and intercoastal markets in times of peace, and added military demand in time of war.

Now, however, the California industry is at a point where local crude oil is no longer adequate to meet current demands. Stocks of crude and products are close to minimum working levels, and supplemental supplies of both are being brought into the area to meet current demands. This change has occurred principally because demand for petroleum products increased faster than the industry was able to discover and develop new crude oil reserves, despite an aggressive exploration program in California.

Since World War II, the Pacific Coast area has changed from its historical position of surplus to one of crude deficiency:

PACIFIC COAST AREA—SUPPLY AND DEMAND BALANCE
(Thousands of barrels per day)

Year	*Local Supply*	*Total Demand*	*Surplus (Deficit)*
1946	923	898	25
1947	982	990	(8)
1948	1,002	973	29
1949	986	959	27
1950	975	1,067	(92)
1951	1,052	1,126	(74)
1952	1,064	1,106	(42)
1953	1,085	1,152	(67)
1954	1,059	1,155	(96)

This deficiency of local supply has not found the industry unprepared. All demands have ben met, and West Coast companies have taken the necessary steps to develop new sources of supply adequate to meet current and anticipated demands.

Following are some of the changes in markets and the principal projects that have developed since World War II to supplement California's petroleum supply:

Pacific Northwest Market: The Pacific Northwest, once dependent entirely upon California for its petroleum supply, is experiencing major and interesting changes in sources for crude and petroleum products. Expanded refinery capacities in Utah, Wyoming, and Montana, together with new products pipe lines westward into Idaho, Eastern Oregon, and Washington, are providing new markets for products from Rocky Mountain area crude oil. New refineries in the Puget Sound area now are supplying part of the Oregon and Washington markets with products from Canadian crude oil. These new sources are not viewed as threats to the California industry, but rather as logical supplements to California's now inadequate crude supply.

Canadian Crude Oil: The 1947 discovery of oil in Alberta, and completion of the Trans Mountain oil pipe line from there to the West Coast late in 1953, provides a principal source of added crude for West Coast refineries. The pipe line distance from Edmonton, Alberta, to British Columbia is only 711 miles. This makes the Alberta fields the closest to the Pacific Northwest markets, closer even than California, and this is a favorable economic factor.

PACIFIC COAST AREA

The Trans Mountain line presently has an installed throughput capacity of 150,000 b/d, and an ultimate potential capacity of 300,000 b/d. Approximately 60,000 b/d of this will be used by British Columbia refineries, leaving a potential 240,000 b/d available for U. S. West Coast refineries. In effect, the total 300,000 b/d potential will be a net addition to California supply, since heretofore British Columbia markets have been supplied from California.

Pacific Northwest Refinery Center: In Washington and Oregon, there is a market for some 250,000 b/d that historically has depended on California as a source of supply. Therefore, with the availability of Canadian crude oil, it is logical that West Coast oil companies should view the Pacific Northwest area as a desirable location for needed additional refinery capacity, and Canadian crude as one additional source to meet the growing deficiency of California oil.

General Petroleum Corporation, West Coast affiliate of Socony Mobil Oil Co., built the first complete refinery in the Pacific Northwest at Ferndale, Washington. This 35,000 b/d refinery officially went on stream in December 1954. Shell Oil Company is completing a 50,000 b/d refinery at Anacortes, Washington, which will be in operation late this year, and the site for a third refinery (10,000 b/d) is now being prepared at Tacoma, Washington. Still other West Coast companies have indicated interest in the area through the acquisition of refinery sites.

Rocky Mountain Area Crude Oil: Crude oil from Colorado, Utah, and Wyoming is being refined in Salt Lake City, and is moving through pipe lines into the Pacific Northwest; Montana crude oil, refined at Billings, is moving through a new pipe line into Eastern Washington.

Since World War II, refining capacity in the Salt Lake City area has been increased by 52,000 b/d. This affects West Coast supply and demand balance in two ways: First, it eliminates the necessity of shipping from coastal refining centers into the interior re-

gions; and second, through the 700-mile Salt Lake pipe line with an installed throughput capacity of 42,000 b/d, it makes products available for Southern Idaho, Eastern Oregon, and Eastern Washington.

The 30,000 b/d Yellowstone pipe line from Billings, Montana, to Spokane, Washington, and the 12,000 b/d Pioneer line from Sinclair, Wyoming, to Salt Lake City provide additional capacity of 42,000 b/d for products to West Coast markets.

Products from West Texas: The Arizona market heretofore has been supplied almost entirely from California. It has also been receiving some relatively small truck and trailer deliveries from West Texas and New Mexico. These deliveries are now expected to increase substantially with the completion late this year of the Southern Pacific 13,000 b/d products pipe line from El Paso, Texas, to Phoenix, Arizona.

Natural Gas Imports: In 1947, natural gas came into California for the first time from Texas and New Mexico. This movement now has reached such proportions that it supplies energy in California equal to 233,000 b/d of fuel oil, and energy in Arizona and Nevada equal to 30,000 b/d. The 1,400 million cubic feet per day of gas now coming into California from this source represents 50 per cent of the total gas marketed in California. Its importance is not realized unless one knows that, in terms of energy, the gas now coming into California is equivalent to the power generated by 14 Hoover Dams at full capacity.

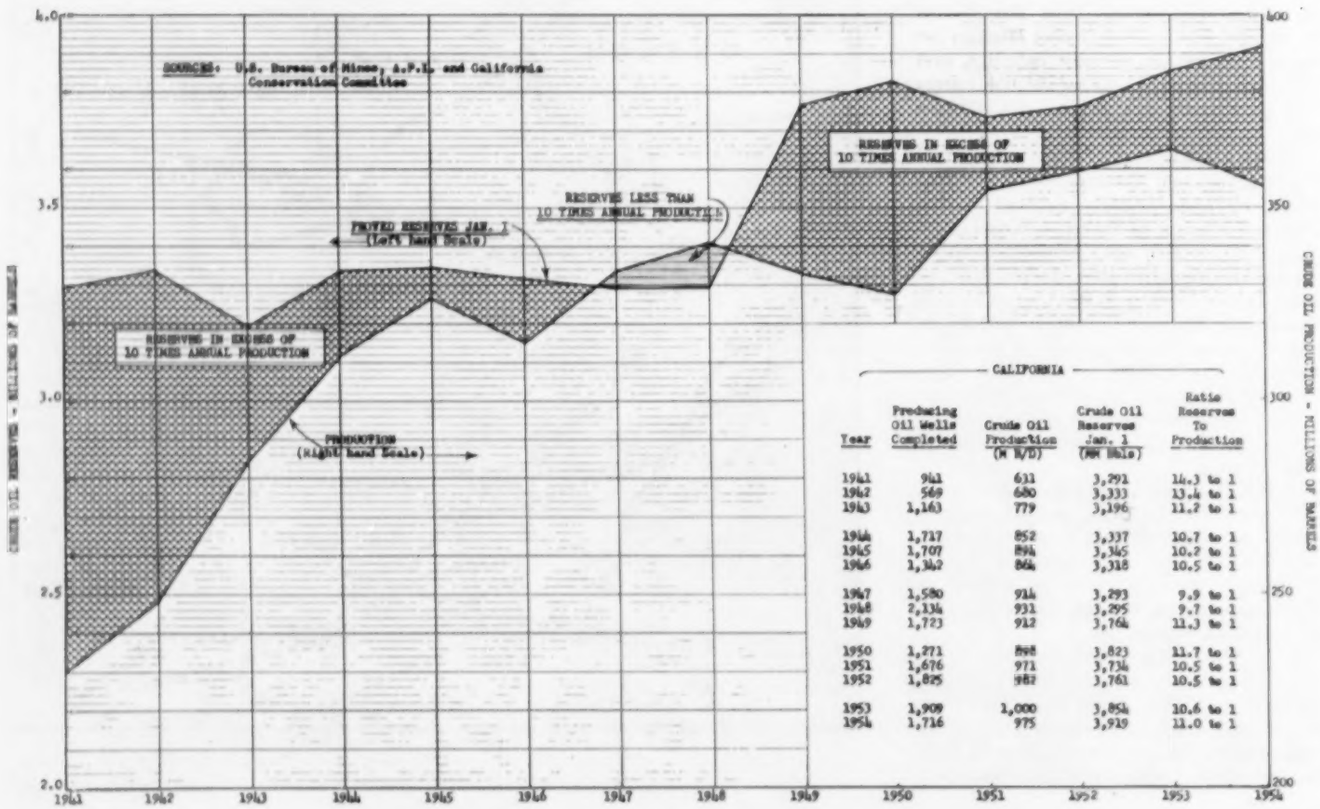
The first natural gas for the Pacific Northwest is now scheduled for late 1956. The past year brought an end to the prolonged controversy over what company would bring natural gas into the area. The Federal Power Commission has decided in favor of the Pacific Northwest Pipe Line Corporation, which will serve the area from the San Juan Basin in Southern Colorado and New Mexico. This decision temporarily halted plans of the rival West Coast Transmission Company to bring Canadian gas from the Peace River area. However, the two companies have since reached an agreement to connect sources, making both Canadian and U. S. gas available to this new market. The importation of Peace River gas under this plan is currently before the Federal Power Commission for approval.

Refinery in Hawaii: Plans have been announced by a West Coast oil company for early construction of a 30,000 b/d refinery in Hawaii. It is likely that this refinery will operate on foreign crude oil, thereby reducing the demand for California oil which historically has supplied the Hawaiian Islands.

These new facilities just outlined, which are now operating, building, or programmed to bring added supplies of oil and natural gas to the West Coast, are all being developed with private capital at an announced cost of approximately $1,353 million. Added facilities for crude oil and products alone (exclusive of natural gas), when operating at capacity, will add over 400,000 b/d to the California supply. These new facilities not only assure an adequate supply of oil and gas but also are helping to eliminate the well-known chronic surplus position of heavy fuel oil on the West Coast.

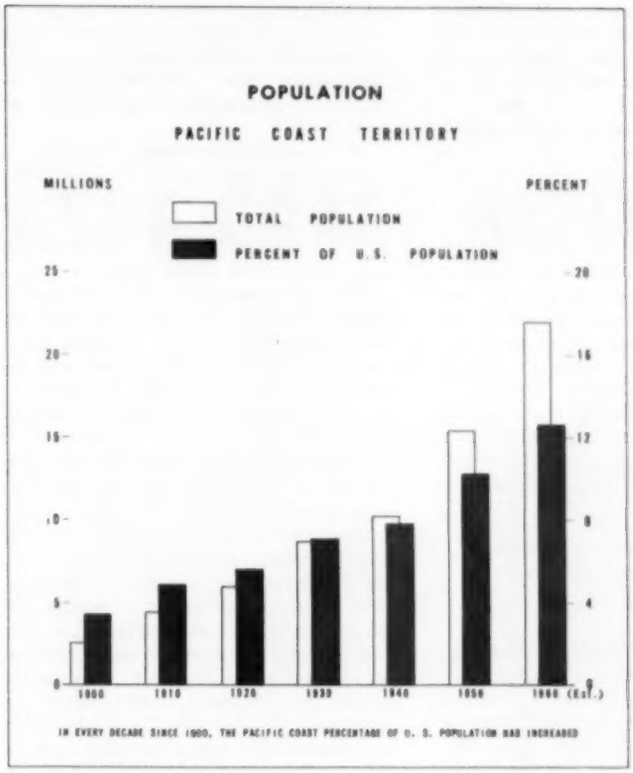
The California industry, because of the comparatively low average gravity of its crude oil, has always had the problem of finding markets for the excess residual fuel oil yielded from the quantities of crude required to meet light products demand. After World War II, with the loss of foreign markets (particularly Japan), dieselization of railroads, and the initial importation of natural gas, markets for fuel oil declined and the problem became increasingly greater.

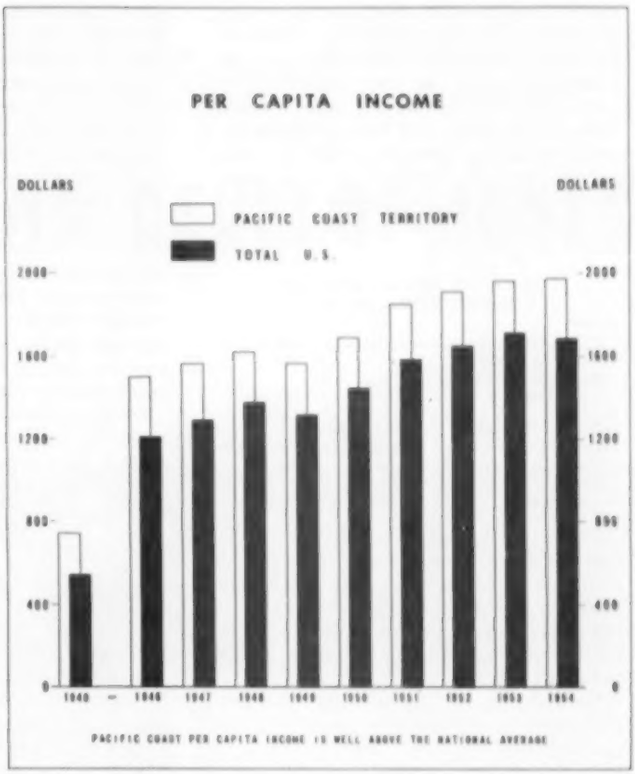
In the past, accumulated surpluses of residual fuel oil were disposed of by abnormal war-time demands or by sales in uneconomic markets outside our normal market area. Only in recent years have West Coast companies, acting individually on the basis of their own respective situation, taken steps to meet their current needs in a manner which reduced the supply of fuel oil. While the various methods differ between companies, most of them



CALIFORNIA

Year	Producing Oil Wells Completed	Crude Oil Production (M B/D)	Crude Oil Reserves Jan. 1 (MM Bbls)	Ratio Reserves To Production
1941	941	611	3,791	14.3 to 1
1942	569	680	3,333	13.4 to 1
1943	1,163	779	3,196	11.2 to 1
1944	1,717	852	3,337	10.7 to 1
1945	1,707	894	3,345	10.2 to 1
1946	1,342	864	3,318	10.5 to 1
1947	1,580	914	3,293	9.9 to 1
1948	2,134	931	3,295	9.7 to 1
1949	1,723	912	3,764	11.3 to 1
1950	1,271	898	3,823	11.7 to 1
1951	1,676	971	3,734	10.5 to 1
1952	1,825	982	3,761	10.5 to 1
1953	1,909	1,000	3,854	10.6 to 1
1954	1,716	975	3,919	11.0 to 1





employ one or a combination of the following:

Shut-In Heavy Crude Oil Production: Early this year approximately 15,000 b/d of heavy California crude oil was shut in. Most of this is now back on production because of the overall need for added crude supplies.

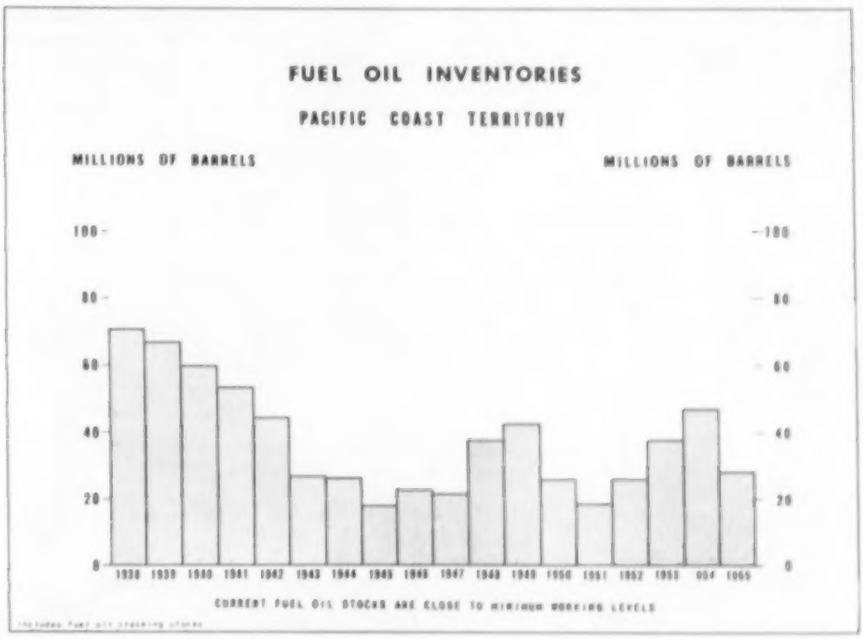
Importation of Light Crude Oil: The average gravity of foreign crude imports is approximately 35° A.P.I., whereas the average gravity of California crude oil is only 26°. Foreign crude oil imports in 1954 averaged 51,000 b/d; 1955 imports are expected to average close to 92,000 b/d. If it is assumed that California crude production can be maintained at the current 975,000 b/d rate, and that there will be a nominal 3 percent annual increase in crude oil demand (all of which will be met by imports), the average gravity of *total* crude supply over the next five years would be raised to approximately 28° A.P.I. This means proportionately less fuel oil from refinery operations.

Importation of Light Products from U.S. Areas Outside the Pacific Coast: By this method it is possible to reduce the crude runs to stills which otherwise would be required to meet light product demand, but which also would increase the fuel oil yield.

Following are the quantities of gasoline and natural gasoline received from outside areas in recent years, and the calculated reductions in fuel oil supply that would otherwise have been produced if this same gasoline had been made from crude in California refineries. Figures are in thousands of barrels daily:

Year	*Gasoline Receipts*	*Nat. Gasoline Receipts*	*Total Receipts*	*Reduced F.O. Supply*
1950	3.3	0.4	3.7	3.3
1951	8.7	2.3	11.0	11.5
1952	13.8	5.2	19.0	19.6
1953	24.4	8.1	32.5	31.3
1954	28.2	8.6	36.8	36.6
1955 (Est.)	27.0	11.0	38.0	35.0

Added Secondary Refining Processes to Convert Heavy Fuel Oil to Light Products: Fuel oil yields from refinery operations, as a percent of crude processed at refineries, have been reduced from 39.8 percent in 1949 to 35.1 percent for the first six months of 1955. Thermal cracking capacity since 1949 has increased by approximately 20



percent, but more important are the coking plants that have been built and are planned for early construction. Currently there are announced plans for four coking plants (one completed in August 1955) which, when in operation, will have potential capacity to reduce West Coast fuel oil yields by approximately 57,000 b/d. If we apply this reduction to the industry operations for the first six months of 1955, results would be as follows:

WEST COAST REFINERY OPERATIONS
(First Six Months of 1955)

Actual	
Crude Oil Processed at Refineries	1,039 M b/d
Fuel Oil Yields	365 "
Fuel Oil Yields—% of Crude Processed	35.1%
Adjusted for Added Cooking Facilities	
Crude Oil Processed at Refineries	1,039 M b/d
Fuel Oil Yields 365 minus 57	308 "
Fuel Oil Yields—% of Crude Processed	29.6%

Summary: It seems reasonable to assume that with the present new facilities and others to be added in the future, together with the favorable effect of added light crude imports to the West Coast, future fuel oil yields will be considerably below the 35-36 percent level.

With the crude runs necessary to meet gasoline demand averaging something less than 1,200,000 b/d over the next few years, it can be assumed, in planning for the near future, that total fuel oil supply will probably not exceed a maximum of some 360,000 b/d.

Fuel oil demand outlook: For purposes of analysis and discussion, the West Coast fuel oil market can be segregated into the following two general classifications:

Markets Where Oil and Gas Normally are Interchangeable: In these markets, availability of natural gas at competitive prices and the weather are two important factors. For forecasting purposes, normal weather has been assumed. More important, it is assumed that over a period of years the availability of added natural gas will, in total, supplement rather than replace fuel oil. With the growing demand for electric energy in California (which has been increasing at the rate of 7 percent per year) and the limited additional availability of hydro-power, added requirements for fuel oil at steam-generated electric plants should compensate for anticipated loss of other fuel oil markets to natural gas.

On the basis of these assumptions it is expected that future demand for fuel oil in these interchangeable markets will approximate 150,000 b/d.

Markets Where Oil and Gas Normally Are Not Interchangeable: These markets are subject to a variety of influences due to circumstances and conditions that are extremely difficult to forecast. However, for the near future, it seems reasonable to expect the total of these markets to average approximately 210,000 b/d.

Fuel oil stocks currently are close to minimum working levels, and the industry outlook for a balanced fuel oil position appears to be better now than at any time in the recent past:

Outlook for Supply—Maximum of ..... 360,000 b/d
Outlook for Total Demand—Average of ..... 360,000 b/d

A favorable industry position, however, does not necessarily assume the same for individual companies. Very likely, there will continue to be strenuous competition for the large volume fuel oil markets. The three principal large volume markets available on the West Coast will continue to be utilities, bunkers, and military.

Outlook for west coast petroleum supply and demand: Over the next several years, West Coast total demand will average close to 1,300,000 b/d, with military liftings and foreign offshore shipments about 200,000 b/d, and civilian domestic demand approximately 1,100,000 b/d. Of course, this will not be the exact market at any particular time, but in a broad general way, it is the West Coast market. Average annual increases of 30,000-40,000 b/d in total demand are expected, with the largest volume increases in gasoline. To supply this market, crude oil and products in increasing quantities must be brought in from outside areas.

California crude oil production during the Korean War reached an all-time peak of 1,010,000 b/d. Since then, despite vigorous exploration and development, crude oil production in California has declined to the current rate of 975,000 b/d. No new important oil field has been found for several years.

It is probably true that eventually substantial new reserves will be developed in offshore areas of California, but there are many political and operational problems still to be solved before any substantial production from these reserves can be realized. Considering the fact that approximately 215,000 b/d of new production must be developed each year to offset normal decline in California old and new well production, it seems reasonable to assume that despite the potential offshore production, California will do well to maintain the current 975,000 b/d production rate. There is little prospect that we ever again will have a surplus of California crude oil.

The inability of California oil to meet the ever increasing demand for added energy on the West Coast should not be viewed with alarm. Development of new sources of supply, added transportation facilities, and new and enlarged refining centers have in effect caused a steady geographical shrinkage of the more remote market areas previously dependent on California oil. This is a normal sequence of events in an industry as competitive and dynamic as the petroleum industry.

Even the need for oil from foreign sources should not be viewed with alarm. Here in California there is no producibility of crude in excess of efficient rates of production, and there is a market for all of the crude oil which can be efficiently produced. Imports to the West Coast cannot possibly damage local producers of crude oil as long as this condition continues. There also are several reasons why it is in the national interest to import a part of our large requirements.

The United States has less than a quarter of the world's proved reserves of oil. Out of this small share we are producing half the world's oil and consuming more than half.

Much of the foreign reserve represents an American contribution to the development of resources of friendly nations. The American contribution has been one of skill and capital. This was the original Point Four Program. Today the foreign oil industry conducted by American companies employs more than a quarter million people—nearly all of them nationals of the country where they work. The royalties and taxes paid to the governments of these countries and the money paid to their nationals for wages, goods and services enable them to buy products here in the United States and elsewhere.

The present situation in California represents a better balance and a better outlook for the future than at any other time in history. There are no problems greater than those a good oil man considers routine, provided only that the world can be kept free and at peace.

MARKETS WHERE OIL AND GAS ARE NORMALLY INTERCHANGEABLE
(Thousands of Barrels per day.)

Year	*Utilities*	*Mines & Mfg.*	*Heating*	*Oil Co. Use*	*Total*
1950	41	46	22	21	130
1951	57	48	22	15	142
1952	47	55	25	18	145
1953	62	52	23	14	150
1954	45	53	21	24	143
1955 (Est.)	60	54	24	27	165

MARKETS WHERE OIL AND GAS NORMALLY ARE NOT INTERCHANGEABLE
(Thousands of Barrels per day.)

Year	*Railroads*	*Vessels*	*Misc. & Losses*	*Military*	*Offshore Incl. A. & H.*	*Total*
1950	63	59	9	39	78	248
1951	50	69	8	52	62	241
1952	43	72	7	37	51	210
1953	33	86	6	36	58	219
1954	24	76	7	41	59	207
1955 (Est.)	22	73	6	39	100	240

WEST COAST REFINING DEVELOPMENTS

During 1955 West Coast refining capacity will increase sharply as construction now in progress is completed. On January 1, 1955 throughput capacity was 1,295,300 b/d, according to the U.S. Bureau of Mines. This represented 15.4 percent of total U.S. throughput capacity at that time.

By the end of 1955 the West Coast will have about 17 percent of U.S. capacity, nearly where it was back in 1947. Among the areas in which activity is highest is the Pacific Northwest.

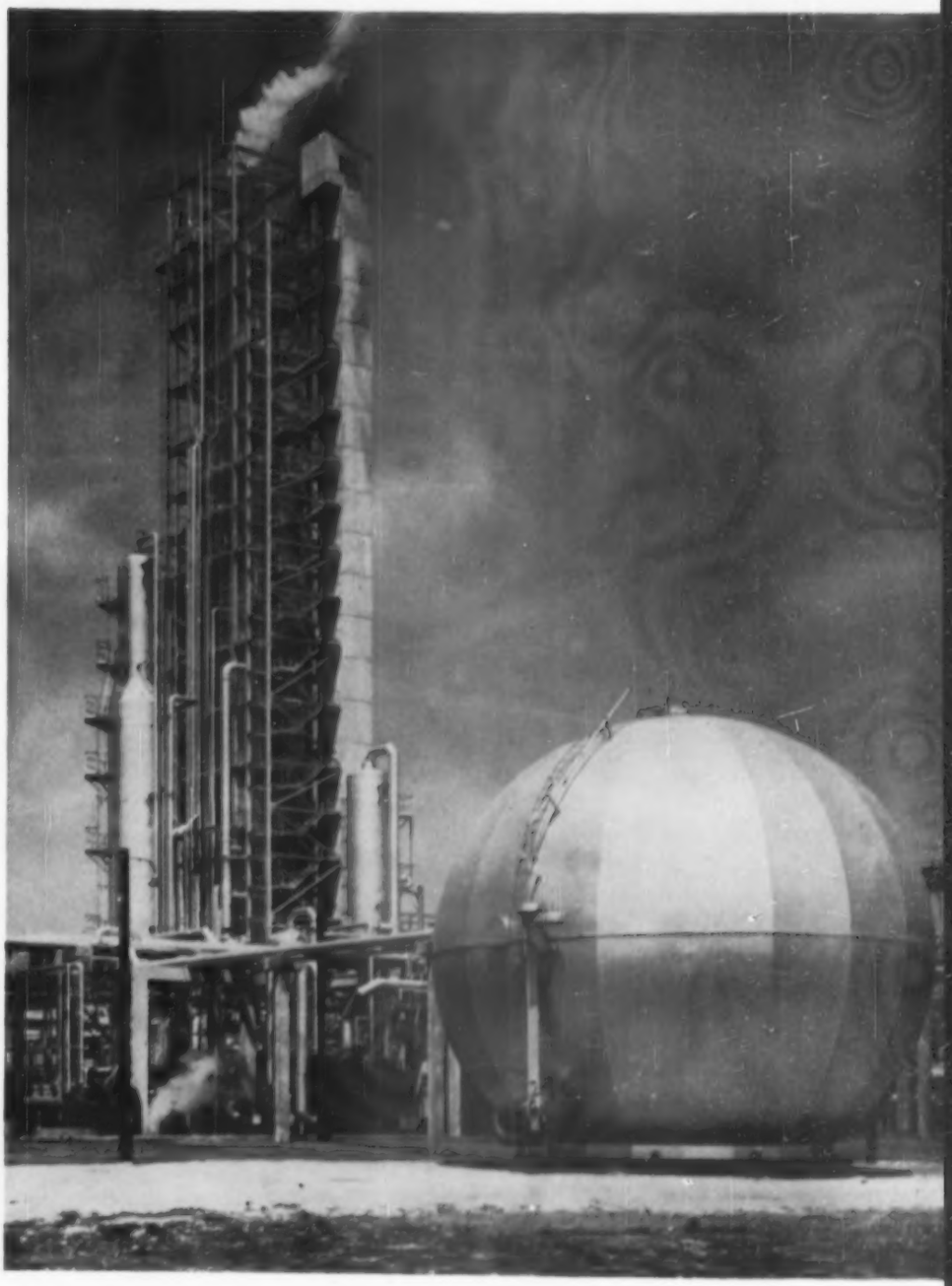
An increasing amount of West Coast refining is dependent upon imported crude. With California production barely holding its own, and presenting the problem of refining heavy crudes of an average 26° API gravity, more refiners are turning to imports. To supply Northwest and other West Coast markets the new Trans Mountain pipe line from Canada will provide about 240,000 b/d. Meanwhile imports from Sumatra continue and a refinery is planned for Hawaii, long supplied from California, to operate on imported crude.

One of the recent outstanding refineries recently completed is the Ferndale, Wash. plant of General Petroleum Corp., the West Coast affiliate of Socony Mobil. This 35,000 b/d plant came on stream during 1954 but an important section, the world's first Thermofor catalytic reformer, with 19,000 b/d capacity was not activated until March, 1955.

The largest refinery to be completed this year in the United States is at Anacortes, Wash. This is the 50,000 b/d plant of Shell which will operate mostly on Alberta and other Canadian crudes. Crude distillation began during September and during November the entire plant will begin operation, starting with the Platformer followed in turn by the cat cracker feed preparation unit, the cat cracker itself, the gas plant and finally the polymerization unit.

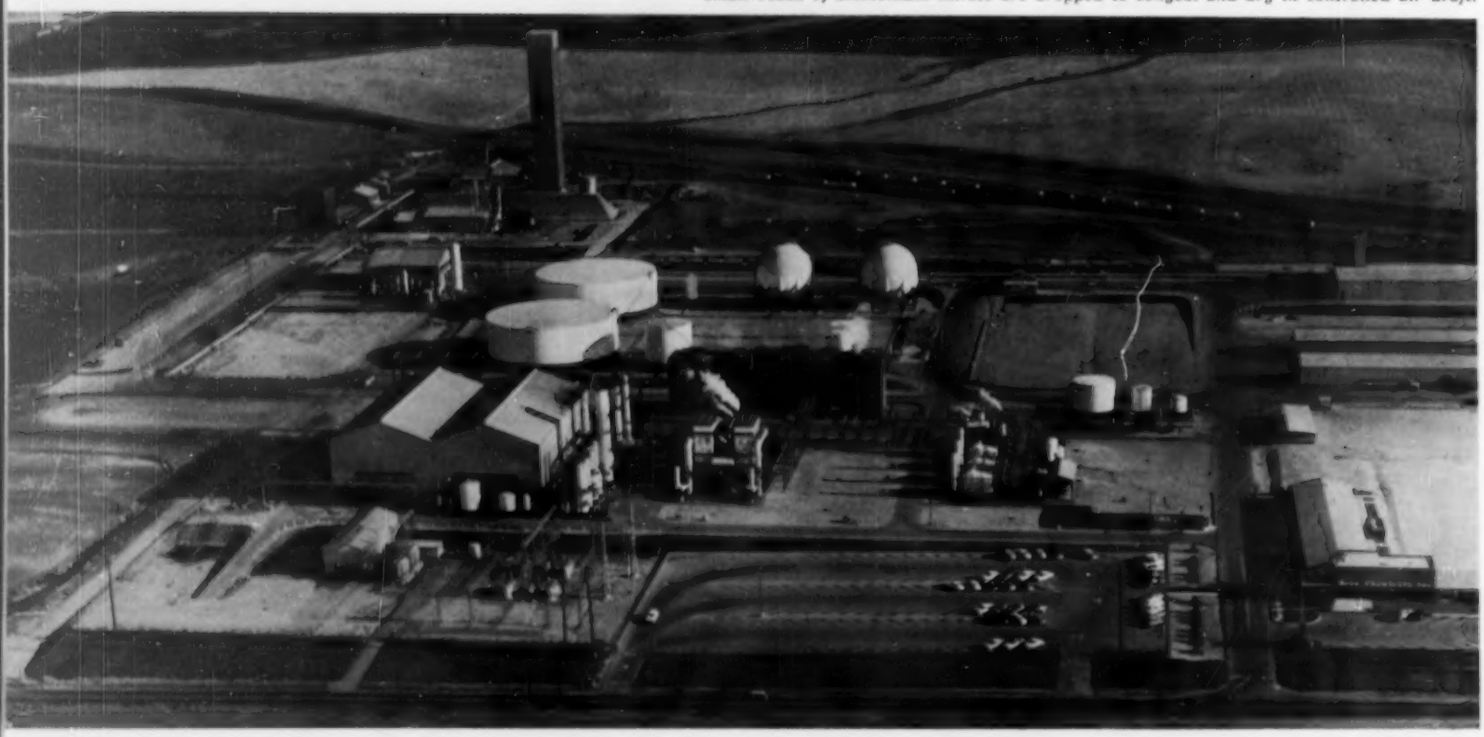
Union Oil Company has initiated a $70 million refinery program, and recently added to its Oleum refinery a 15,750 b/sd Unifiner, a 14,500 b/sd Platformer, a 6,500 b/sd Unisol plant, hydrogen sulfide recovery plant and a 60-ton per day sulfur plant. At Santa Maria a new refinery was completed by Union recently which has a unique feature in its new data reduction

World's first Thermofor catalytic reformer, using process developed by Socony Mobil Oil Co., Inc., is shown above at Torrance, Calif., refinery of General Petroleum Corp. (Socony Mobil's affiliate). Unit has a capacity of 19,000 b/d. It was put on stream in March, 1955.



Coke drums and distillation facilities at the Santa Maria refinery of Union Oil Co. of Calif., Arroyo Grande, Calif.

New Brea Chemicals ammonium nitrate plant near Brea, Calif. At left is 200 foot aluminum tower where hot, small beads of ammonium nitrate are dropped to congeal and dry in controlled air draft.



Largest refinery completion in the United States this year will be the 50,000 b/d refinery of Shell Oil Co. at Anacortes, Wash. Shell photo.

system which went into operation during early 1955. This system scans continuously all critical operating points and records plant operating information, preparing a typewritten log sheet of all significant readings and types a record when any condition goes beyond a set range.

The new Santa Maria installation consists of twin delayed cokers, each with a crude charge capacity of 10,500 b/d and a combined hydrogen sulfide removal and sulfur plant. It is designed mainly to convert heavy crudes found in the area into high quality feed stock for use in the Oleum refinery of Union Oil and about the only products which it will produce itself are sulfur and coke, the primary distillation taking off the top products for use at Oleum and the remainder leaving a heavy material for the coking furnaces where two separately operated units are set up so one can operate while the other is shut down for repairs or cleaning, thus eliminating the need for large storage facilities for oncoming crude. Approximately 600 tons of coke are produced daily by this method.

The Texas Company has a 25,000 b/d plant under construction at Wilmington, Calif. It is to be completed during the first quarter of 1956 and consists of a furfural unit which is somewhat unusual in that it is to be applied to the middle distillates, rather than lubes.

A further 10,000 b/d of refining capacity well be added when Pacific Oil and Refining Company's refinery at Tacoma, Wash. comes on stream.

Among the refineries which are coming up but have not yet reached the construction stage is Standard Oil Company of California's 25-30,000 b/d plant at Honolulu, also to operate on imported crude. Other refineries under consideration include a 20,000 b/d refinery by Sunset Oil Co. at Portland, Oregon; a 6,000 b/d cat cracker by Rothschild Oil at Sante Fe Springs, Calif.; a 17,000 b/d catalytic reformer at Watson, Calif. by Richfield Oil which is now planning; for mid-1956 a catalytic reformer at Long Beach by Hancock Oil Co. with 2,500 b/d capacity and one of 6,000 b/d capacity at Signal Hill, both at the ODM certified stage.

Caminol is planning refining facilities at Hanford, Calif. and has also obtained ODM approval. A 1,100 b/d Hyperformer unit is being built at Calstate Company with Union Oil as the licensor. A 10,000 b/d topping unit at Wilmington, Calif. by Fletcher Oil Co. has obtained ODM certification.

Tidewater Associated is one of several companies planning extensive refinery expansion. To its refinery at Avon will be added a coker, gas plant, hydrodesulfurizer, and enlarged cat cracking facilities. Union Oil Co. plans to spend some $3.2 million for expansion and new facilities, including facilities for handling enriched crude at Los Angeles which is now in the engineering stage and planned addition of gas, oil and heavy side cut strippers. A new Union lube oil building is now under construction for completion around the first of the year at Los Angeles.

Petrochemical developments are also important in the West Coast's development. Carbide and Carbon Chemicals Co. has a 60 million lb/yr polyethylene plant under construction at Torrance, Calif. for completion by the end of this year. A 160-ton anhydrous ammonia plant is being built by Columbia River Chemicals at Pasco, Wash. also for completion around the end of 1955 and a 110-ton urea plant and a 140-ton ammonium sulfate plant are planned. A fluid coking unit was in the ODM certification state for Hancock Oil Co. in the Signal Hill area.

Brea Chemicals Inc., subsidiary of Union Oil Company of California, produced its first carload of "prilled" ammonium nitrate fertilizer during the last week of September from its new nitric acid and ammonium plant of 137 tons capacity.

In addition, considerable petrochemical construction is planned by Standard of California at their Richmond plant, near San Francisco, totaling an expenditure of some $23 million. Among the planned installations are an ammonia plant and a nitric acid plant of 300 and 225 tons respectively for completion in mid-1956. There is presently engineering an isophthalic plant of about 50 million tons capacity yearly, scheduled for completion about November of 1955.

Stauffer Chemical is engineering two sulfuric acid plants at a total cost of about $840,570. One is to be located at Compton and the other at Richmond, Calif.

Ontario Proposes New Plan For Canadian Gas Line

By W. L. Dock

FEDERAL and provincial governments are stepping-up their efforts to get Canada's long-stalled trans-Canada gas pipe line project under way.

Ontario and federal government authorities have moved into active committee-work stages on the latest proposal to unsnarl the $350 million pipe line financing puzzle—a Crown company that would build the toughest section of the 2,350-mile, West-East line.

In the new plan, a Crown company, jointly financed by Ottawa and Ontario, would build a 1,000-mile stretch of line from the Manitoba border eastward to Kapuskasing in Northern Ontario. This is the high-cost section of the line that has been blocking pipe line plans for several years now. To build the line through this sparsely-settled, rugged terrain would cost around $120 million. The proposal is that the federal government would put up two-thirds and Ontario the remainder.

Trans-Canada Pipe Lines would arrange private financing for the western and eastern sections of the system; that is, across the prairies and down to Winnipeg, Man. and Emerson on the international border and the stretch from Kapuskasing to Toronto and from Toronto to Montreal.

The need for quick action has been impressed on the newly-appointed government committees and a new note of urgency is pervading the whole pipe line picture. Hopes are high that financing hurdles can be cleared away in time for a spring 1956 start on two sections of the line—the stretch across the prairies and the Toronto-to-Montreal extension.

Ontario government authorities are none to happy with the latest plan, though. They are urging a close look at a much bolder proposition of their own—a Crown company that would build the entire line, right from Alberta to Ontario. There would be provision for the other provinces to come in if they so desired.

The whole weakness in the elaborately integrated trans-Canada pipe line project as presently conceived, they point out, is that the U.S. Federal Power Commission exerts the power of life and death over the entire program. FPC has the final say on whether Tennessee Gas Transmission Co. can import 200 million cubic feet of Canadian gas daily into U.S. Midwest and export up to 90 million cubic feet daily of U.S. gas into Ontario. The two steps are all-essential in the overall trans-Canada plan and the actual financing of both the eastern and western sections of the line.

Even if FPC approval were gained for both proposals—and strong opposition is already lining up in the U.S. against import of Canadian gas into the Midwest—chances are looked on as slim that it would be forthcoming in time to permit a next spring start on the two proposed pipe line jobs.

In discussions with Prime Minister St. Laurent at Ottawa this week, Ontario Premier Leslie Frost is urging a close federal look at the bolder proposal. The main contention is that this appears the only way of assuring a start next spring on the national pipe line project. In the meantime, the Tennessee Gas Transmission Company applications could be filed with FPC and every effort made to secure the Midwest U.S. market for Canadian gas and the additional U.S. imports to serve the Montreal market area. If it becomes apparent that such strong opposition was developing against these applications as to put the final issue very much in doubt, or if the whole case looked as if it would drag on interminably in the courts, then the Crown company plan could be put into force quickly.

Ontario is suggesting three different ways of handling the bolder project:

1) The Crown company would build the entire line and operate it as a common carrier.

2) Would build the entire line and lease it back to Trans-Canada—or another company—with an option to buy within a given period of time.

3) Would build the entire line and operate it as a Crown company, buying and selling gas as well as transporting it.

The third proposition can be pretty effectively ruled out, as Ottawa authorities will shy away from the obviously unpalatable political aspects of buying and selling gas. Besides, this plan would be expected to raise problems of its own in dealing with U.S. gas importing and exporting companies.

The advantages Ontario is listing for the bolder plan are that it would get the job done right away and that, through easier financing terms, a Crown company could save some $3-4 million annually in interest charges.

This saving in interest charges along with likely lower depreciation write-offs in early years and less urgency to show profit in early stages would likely enable western gas to be laid down a little more competitively with other fuels in distant eastern markets.

There is little doubt that Ontario will win a promise from Ottawa to at least take a good look at this bigger Crown company proposal. As a matter of fact, Ontario is expected to withhold its $30-40 million contribution to the original Crown company proposal until this is done.

Following a pipe line meeting this week between the Prime Minister, Trade Minister Howe and Finance Minister Harris, representing the federal government; and Premier Frost and Provincial Treasurer Porter, representing Ontario, Mr. St. Laurent made the following comment:

"If we get other things tied up properly so that providing the link from the Manitoba border to central Ontario is the thing required to get the gas to the East, the two governments will provide that link as a carrier enterprise to be used by the suppliers on conditions which would be designed to provide no subsidy."

Mr. St. Laurent did not specify what he meant by "the other things" which had to be "tied up properly" before a northern Ontario line could be undertaken by the Federal and Ontario governments. It is believed that one of the main undetermined factors is assurance that Trans-Canada could arrange financing for the western and eastern sections of the line even if the governments financed the Manitoba-Ontario link.

It is known that during the debate in the Federal House of Commons on the necessary bill to create some form of construction authority, the Prime Minister would be required to give the most positive assurances that the governments were not subsidizing the pipe line—were not bailing out "the wealthy U.S. promoters" of the Trans-Canada project.

Probably no pipe line project in history has been faced with such tremendous obstacles. When Ottawa insisted that the pipe line to eastern Canada follow an all-Canada route, swinging north of the Great Lakes, financing problems arose immediately. Most federal authorities have come to admit now that Ottawa's strict adherence to

this route likely means federal financing participation in the project in some form.

Back of the whole long drawn-out pipe line story are the rapidly mounting reserves of natural gas in Alberta—estimated now at over 16 trillion cubic feet and growing at the rate of 1½-2 trillion cubic feet annually. Pressure from the Alberta government and gas producers to secure major market outlets for these shut-in reserves has been mounting sharply.

If all the necessary financing steps are successfully completed by late winter here is the likely construction timetable:

1) Start on the western section of the main transmission line from Princess field in eastern Alberta to Winnipeg, with a branch down to Emerson on the international border, would be made by next May, with completion date scheduled for late fall.

2) Start next spring on the Toronto-to-Montreal extension of the presently operating pipe line from Niagara to Toronto. Completion by fall.

3) Start and completion of the extensive gas-gathering system in Alberta itself in the 1956 construction season.

4) Start made on such preliminary steps as final survey and securing of rights-of-way of the second section (from Manitoba to northern Ontario) of main transmission line next year. Completion of this section by late 1957 or early 1958.

Tennessee Gas Transmission is now preparing the mass of data necessary for its application to FPC. In all, Tennessee will be seeking three different approvals:

Permission to import 200 million cubic feet of gas from Trans-Canada into the Mid-west (Emerson, Man.) for integration into Tennessee's present pipe line system at a point in Tennessee, with provision made for upping this import in later years.

Permission to export up to 90 million cubic feet of gas daily to Trans-Canada at a Niagara River crossing point. This would be shut off once Canadian gas was available from the West.

Permission to import up to 100 million cubic feet of gas from Trans-Canada daily on an interruptible basis at the Niagara crossing-point once Western Canadian gas is available.

Although Tennessee has not disclosed in what form these submissions will be made, it is thought likely that provision will be made to isolate the 90 million cubic feet export proposal from the western import proposal. The idea here is to enable the eastern pipe line segment (from Toronto to Montreal) to be built this summer. At the moment it looks as if there will be considerably more opposition developing against the western import proposal and that this could hold up Trans-Canada's entire next summer's construction program if the three proposals were bundled up into one indivisible package.

Tennessee Gas Transmission Co. has filed a series of applications before the U. S. Federal Power Commission in an effort to obtain action on the latest Canadian gas market development plan. Tennessee aims at a variety of hands-across-the-border linkups between Tennessee and a subsidiary; Trans-Canada Pipe Lines, Ltd.; and Tennessee's distributors. The upshot aimed at is that Trans-Canada would pump a large volume of additional gas eastwards to Emerson, Manitoba; through a line to be built near there it would enter the United States and the Tennessee system, for distribution in the U. S. Midwest. Tennessee also would bring more gas from Gulf Coast United States to feed the Midwest.

The twin leg of the project calls for Tennessee to expand its system and to supply a large volume of additional gas to Canada at the Toronto, area. This, in turn would be shipped by Trans-Canada through a new line to Quebec. For Trans-Canada, the Tennessee tieup would make it economically feasible to lay two segments of an all-Canada line; later on, under reported plans, Trans-Canada would complete the system by a link across the Great Lakes area.

The Tennessee plan is similar in aims to one filed a few years ago by Northern Natural Gas Co., Omaha. The Northern project came to the state of hearings, but failed to win approval; it still is pending, however.

The Tennessee plan became at once a target of attack by rival pipe line companies, coal interests and others. This indicates that long and extended hearings will be needed. One guess is that a year may pass before the FPC can complete the regular studies and render its decision. Northern for one is expected to object in part. Michigan-Wisconsin Pipe Line Co., and Panhandle Eastern Pipe Line Co., are expected to object as the new Midwest supply would invade their markets.

Pacific Northwest Gas Decision By FPC Expected This Year

By Joseph B. Huttlinger

THE U.S. Federal Power Commission is about to hand down a final decision on plans for the first large-scale import of Canadian natural gas to the United States. The timetable of the case points toward a decision before the end of the year; the record of the case indicates approval by the FPC.

Westcoast Transmission Co., Ltd., of Calgary, Alberta, Canada, would bring the gas from Northern Alberta and British Columbia, some 650 miles south of the international border at Sumas, Washington. There the gas would be sold to Pacific Northwest Pipe Line Corp., one of the newest of the huge U.S. natural gas systems, which is putting in a gas distribution system throughout the states of Washington, Oregon, Idaho and nearby. The Canadian supply, some 300 million cubic feet daily, will give the U.S. firm a total of 650 million cubic feet of gas daily to sell. Ultimately, the Westcoast system can supply 700 million cubic feet, more than double the initial capacity.

Westcoast's plan is substantially the same as the company proposed in 1952, and

(*Continued on page 93*)

Part of the route covered by the Westcoast Transmission Company's projected natural gas pipe line passes through this fertile valley near Loon Lake in British Columbia's Cariboo district. White mark almost in center of picture is pipe line survey stake. (Canadian Bechtel Ltd. photo)

IRANIAN DEVELOPMENT

DURING FIRST CONSORTIUM YEAR

OCTOBER 29, 1955 concluded the first year of operations by the Iranian Consortium. A review of the year's operations indicates that their objective, the orderly re-introduction of Iran into the world's production and marketing picture, is being achieved within the framework of the 1954 Agreement.

By the terms of the agreement, the Consortium companies guaranteed to produce the following amounts of crude oil during the first three full years of operation.

YEAR	CUBIC METERS	BARRELS DAILY
1955	17,500,000	314,383
1956	27,500,000	482,076
1957	35,000,000	628,767

[1]On basis of 7.65 bbls/long ton

The following are recent Consortium crude oil production figures from the date the Consortium companies began operations until the end of July 1955. They do not include Naft-i-Shat which is operated by NIOC and produced about 160,000 metric tons or 3,389 b/d in 1954.

	LONG TONS	BARRELS DAILY
Oct. 29-Dec. 31, 1954	898,000	109,402
January 1955	929,000	229,253
February 1955	973,000	265,837
March 1955	1,218,090	300,571
April 1955	1,174,000	299,370
May 1955	1,168,000	288,232
June 1955	1,429,000	364,395
July 1955	1,429,000	248,000
August 1955	1,456,000	388,069

Payments to NIOC: Between Oct. 29, 1954 when the consortium companies took over and Aug. 31, 1954, they have paid £20,398,-925 (about US $57,116,990) to NIOC while in addition NIOC has taken delivery of oil in kind value at £3,566,914 (US $9,987,359).

A new multi-stage stabilizing unit has been put into commission at the Agha Jari field which has increased the annual production potential of this field by some 5,500,000 long tons (about 115,000 barrels per day) to a figure of 22,500,000 long tons (about 480,000, barrels per day). This new unit was built at a cost of £1 million, and it would appear that with the addition of this new unit, the Iranian Exploration and Producing Co. will achieve its guaranteed production figures. The increased production due to this unit is shown in the figures for June and following months.

The facilities for power generation in the fields have been increased by the commissioning of a gas turbine unit at Tembi field during June. No drilling or work-overs have been started as yet, but it is hoped that around the beginning of 1956 a limited work-over and drilling program will be commenced, the exact extent of which has not yet been determined.

All crude exports are being made from Bandar Mashur and for the time being all the crude for export is being taken from the Agha Jari field. The loading facilities at Bandar Mashur have been increased by the building of a third jetty and a fourth jetty is already in course of construction. The crude storage capacity at Bandar Mashur is being extended, and six new tanks were available for that purpose at the end of July 1955.

Under the same agreement, but with guarantee, the Consortium companies indicated a target of refinery throughput during 1955 of 7,500,000 cubic meters or about 136,233 b/d, 1956 of 12,000,000 cubic meters or about 219,467 b/d and 1957 of 15,000,000 cubic meters or about 272,466 b/d.

Refinery throughput figures for the October 29 to December 31, 1954 period are 898,000 long tons or 109,042 b/d. During the first seven months of 1955 refinery throughput figures have averaged 156,861 b/d as shown below:

	LONG TONS		LONG TONS
January	614,000	May	629,000
February	614,000	June	609,000
March	637,000	July	634,000
April	610,000	Total 7 Months	4,347,000

Under the Consortium Agreement of 1954, Article 17, NIOC agreed to perform and carry out non-basic operation with due regard to economy and efficiency and in such a manner as to meet the reasonable requirements of the operating companies.

The term "non-basic operations" means the provision, maintenance and administration of the following ancillary services, in

Distillation units at Abadan refinery.

so far as such services are required by the operating companies in support of their operations, including housing estates, medical and health services, maintenance of roads used by the public, operation of food supply system, of canteens, restaurants and clothing stores, industrial and technical training and education, guarding property, welfare facilities, public transport, communal water and electric supplies and other public services.

Many amicable discussions have taken place between the representatives of the operating companies and those of NIOC with regard to the functioning of these "non-basic operations." It is pleasant to record that great advances have been made.

The medical and health services, originated by AIOC have now been taken over by NIOC in full accord with the operating companies and there is every prospect that they will be efficiently run under the new regime. Great efforts are also being made in the field of new housing, especially for that to be occupied by the labor staff, which at present is inadequate for the purpose.

When the agreement first came into operation there was a great shortage of food consumer goods, and a large amount of assistance was given by Iranian Oil Services Ltd., London, to overcome these difficulties.

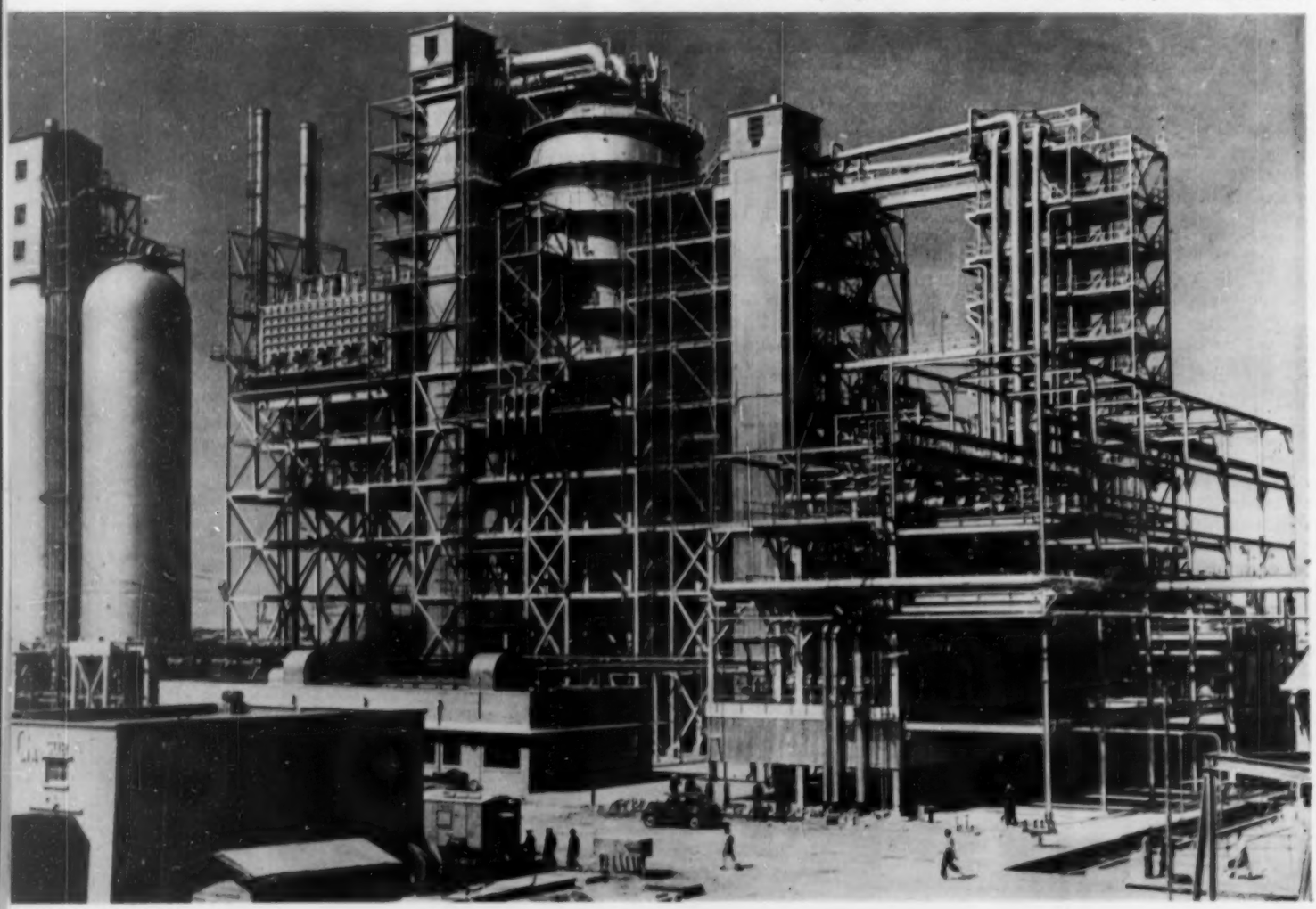
Discussions are taking place in a very amicable atmosphere with regard to the operation of other "non-basic operations" and there is every prospect that these will be carried out in the future to the satisfaction of the operating companies.

In addition to these problems Iran and NIOC have other problems of pressing importance. In the past the movement of finished products from the refinery to Teheran has been by rail tank car. The railway system is very overloaded, causing great delays in the service and this method of moving the products is costly.

Arrangements have therefore been made for the laying of a products line from Ahwaz to Teheran to overcome these difficulties. The total length of this line is 590 miles, the first 340 miles from Ahwaz to Azno, passing over the Taurus Mountains which rise to a height of some 10,000 feet. The proposed route of the line does however not go over the highest part, but is routed through a pass, the height of which is about 7,000 feet.

From Azno to Teheran a distance of 250 miles the pipe line goes over flat terrain. The line will be 10 inches and will have a capacity of two million tons of products per year. The products to be handled will be gasoline, kerosene and gas oil which will be separated for prevention of contamination of slugs of water. The line will be laid above ground for part of the distance and for the remainder underground. The portion laid underground will be wrapped and cathodically protected. It will follow mainly

The 35,000 b/d catalytic cracking plant, construction of which was completed at the Abadan refinery at the end of March 1951 shortly before nationalization.



the road and railway to Teheran, the latter of which was laid by the firm of Richard Costain.

The contract for the part of the line from Ahwaz to Azno, has been awarded to the British firm of Richard Costain-John Brown Ltd., who partly originates from the firm of Richard Costain, so a connection of this firm in Iran has been renewed. The contract for the portion from Azno to Teheran has been awarded to the French firm, Soc. Entrepose. Stewarts and Lloyds are supplying 27,000 tons of pipe for the project, shipments of which have already commenced.

Survey teams are already at work mapping out the route. Completion date has not yet been fixed, but it has to be early, as rail tanks now operating on the railway are not sufficient to supply demand for products and are shortly due to come out of commission. Funds for the project are scheduled to come out of oil income.

Suspicion and xenophobia which were deliberately fostered by the Mossadeq regime are probably now less prevalent, except among the more educated Iranians who are not directly connected with the oil activities and will take some time to die out, but the Iranians who are actively engaged in the oil industry appear to be cooperating in the fullest way with the Consortium companies' representatives.

There are also signs that other departments of the government are realizing that technical foreign aid is necessary for the better development of the country in general as for example the action of the Forestry and Agricultural Department is seeking foreign experts to assist them in that development.

Iran, apart from its oil deposits, has in the past been mainly an agricultural country and climatically and physically is eminently adapted for that purpose, so the development on this side should be of general benefit. Plans are already in hand for the building of cotton mills at Karadj and Kazrin, for which the finance will be supplied out of NIOC's direct sales of crude oil to Italy.

It is understood that some 6,000 kilometers of roads will be built by Iranian labor under the supervision of John Mowlem, Ltd., London, which will supply the necessary tools and equipment on credit and will receive a percentage fee on the total cost for these services. New cement works are projected to cope with the increased demand for cement which the improvement schemes will call for.

From revenue arising from the Consortium company's operation schemes are on foot for large developments in the production of electricity in various parts of the country. The French firm of "Alsthom," Societe Generale de Constructions Electriques et Mechaniques, 38 Avenue Kleber, Paris has been awarded a $4.5 million contract for the erection of a 50,000 kw power station at Teheran.

A contract of the value of $3.58 million for the supply of sleepers for the building of a railway between Shahrud and Meshed has been awarded to the French firm of Societe d'Etudes Ferroviaires. Projects have also been approved for the building of a refrigeration plant and a canning factory.

It is also reported that Krupps of Germany is negotiating contracts for the development of iron, copper and lead deposits in Iran as well as the erection of an iron foundry of a capacity of about 100,000 tons per year.

The total American aid available to Iran during the current fiscal year amounts to just over $127 million of which about $42 million is a free grant. This has aided development work, as has a British loan of £10 million has been accepted, and a French Banks' loan of Francs 5 billion (about $14.3 million) will probably be agreed upon.

General view of Abadan, looking up-river. In the foreground is the housing estate at Bawarda with the old town immediately above.

Iran's Crude Oil Pipe Line System: There has been no major change in the crude oil pipe line system in Iran, since nationalization came into effect in that country. It can be divided into two main sections: one serving the Lali, Masjid-i-Sulaiman, Naft Safid and Haft Kel fields to Abadan and the other serving the Agha Jari and Gach Saran fields to Mashur and Abadan. There is also a three inch high pressure line from the Naft-i-Shah field, which lies both in Iran and Iraq, to the Kermanshah refinery, but this line together with the field and the refinery lie outside the Consortium companies' territory and do not enter into their sphere of operations.

The routes taken by the lines in the two main systems are shown on the accompanying map, which however does not give any indication of the number, sizes and complexity of the lines. Starting at the most northern field, i.e., Lali, the production is carried through a composite 12- 10- 8-inch line, made up of eight miles of 12-inch, 10 miles of 10-inch and 20 miles of eight inch, a total of 38 miles to the main pumping

Distillation unit built to meet local needs in the Agha Jari oil field, South Iran. Multistage gas separators are seen immediately above the column.

station of the Masjid-i-Sulaiman field at Tembi, where it enters the general pumping system.

Two 12-inch lines and one 10-inch line stem from the Tembi pumping station to Wais, a distance of 46 miles, passing through the boosting station at Abgunjik, 14.8 miles from Tembi. At this station, there is a manifold for recycling products to the MIS field.

At Salamat 22 miles from Tembi, a 12-inch line bringing crude oil from the central part of the Naft Safid field enters the system, with no increase in the original number of the main lines. Crude oil from the southeast section of the Naft Safid field is carried first by a 10-inch line to Bohna Abdulla, and then via a 12-inch line manifolded to the Haft Kel field system. Crude oil from the northern system of the Haft Kel field flows by gravity through two 12-inch lines via Bohna Abdulla to Wais, from Wais to the Ahwaz manifold, a distance of 14.5 miles, there are three 12-inch lines and two 10-inch lines.

From the Ahwaz manifold of Kut-Abdullah boosting station the distance of eight miles, and at Kut-Abdullah, two 12-inch lines carrying crude from the southern collecting station of the Haft-Kel field, 61 miles distant, join the system, so that at Kut-Abdullah boosting station, the entry lines are five 12-inch and two 10-inch. One of these 12-inch lines terminates here, and from this boosting station to the terminus at Abadan, a distance of 66 miles, only four 12-inch lines and two 10-inch lines are in operation.

All of the lines of this system are laid overground, and no cathodic protection is required. The pumping and boosting stations at Tembi, Abgunjik, Kut-Abdullah and Dorquain are fitted with steam turbine driven pumps.

The rated capacity of this system is 14 million tons per year and prior to nationalization was of ample capacity to handle the whole of the production requirements of the Lali, Masjid-i-Sulaiman, Naft Safid and Haft-Kel fields. In view of the future production program, it would appear that this capacity will be ample for some time to come.

Incidentally, the production from the above fields at present supplies the larger percentage of crude oil intake into the Abadan refinery. During July 1955, the average throughput of the refinery per day was 155,000 barrels of which 86,000 barrels came from the above fields and 69,000 barrels from the Agha Jari field.

The second part of the pipe line system handles the crude oil production from the Agha Jari and Gach Saran fields, to Mashur which is the crude oil exportation terminal, and to the Abadan refinery terminal.

The Gach Saran field, where the second system starts is a few miles nearer to Abadan than the Lali field, i.e., about 161 miles. A 12-inch line runs via Pazanum direct to the Mashur manifold and is duplicated at Suweira by another 12-inch line to Mashur. The major portion of the second system is devoted to the handling of crude oil from the Agha Jari field, which at present is supplying all the crude for exporation. From figures published by Iranian Oil Participants Ltd. it would appear that the production from this field averaged 262,000 b/d during the month of July, 1955.

From the Agha Jari field to the manifold at Mile 19, there are three 12-inch lines, working pressure 800 psi, one 20-22-inch gravity line and one 16-inch line from the recently commissioned No. 2 production unit, boosted to 925 psi. From mile 19 to Mashur manifold there are five 12-inch lines, one 16-inch line and one 20-22-inch line. The Mashur terminal supplied from this manifold is the loading point for exportation crude, and its facilities for this purpose have recently been increased by the completion of a third tanker jetty with a fourth under construction, as well as the addition of six further large capacity storage tanks.

The 20-22-inch line from Agha Jari to Mashur has a capacity of eight million tons of crude per annum while two 12-inch bleed off lines from the Mashur manifold to Mashur terminal can supply a further eight million tons per annum. The system also extends from Mashur to Abadan, through the Khor Doraq manifold. From Mashur to this manifold, a distance of 25 miles, there are two 16-inch lines and five 12-inch lines, with the same number through to Abadan.

The 20-22-inch line from Agha Jari, is a gravity fed line and is wrapped and buried with cathodic protection. Two of the 12-inch lines from Khor Doraq to Abadan, which pass through marshy terrain, are buried and wrapped for a distance of some 20 miles, but have no cathodic protection. Information indicates that from the time of nationalization until the Consortium took over, the pipe line systems have been well maintained and there has been no undue internal or external corrosion.

Iranian development over the past year has taken place under the terms of the Persia-Consortium Agreement of 1954. This agreement came into effect on October 29, 1954, being made between the Iranian Government and the National Iranian Oil Co. on the one hand and eight major oil companies on the other.

The company with their interests were: British Petroleum Co. Ltd., 40 percent; N.V. Bataafsche Petroleum Maatschappij, 14 percent; Compagnie Francaise des Petroles, 6 percent, Gulf Oil Corp., 8 percent, Socony Mobil Co. Inc., 8 percent, Standard Oil Co. (N.J.), 8 percent, Standard Oil Co. of California, 8 percent, and the Texas Company 8 percent. These companies were known as the Consortium Companies.

On April 29, 1955, a subsequent agreement to which arrangement all the Consortium forming companies had previously agreed in principle, came into being. By this agreement one percent of the percentage interests of each of the original American companies was transferred to and divided among a further nine American companies in equal parts. Later transfers between the companies divided this total of five percent into twelfths, giving Richfield Oil Co. three twelfths, American Independent Oil Co. two-twelfths and one-twelfth each to Hancock Oil Co., The Atlantic Oil Co., Pacific Western Oil Corp., San Jacinto Petroleum Corp., Signal Oil and Gas Co., The Standard Oil Co. (Ohio), and Tide Water Associated Oil Co. By this arrangement American oil companies retain a 40 percent interest.

The original agreement is for a period of 25 years with provision for three five-year extensions at the option of the Consortium, subject to specified terms and conditions.

To carry out the provision of the agreement, two operating companies, both incorporated in the Netherlands, were formed by the Consortium companies. These two operating companies are: Iraanse Aardolie Exploratie en Productie Maatschappij N.V. (Iranian Oil Exploration and Producing

Co.) and Iraanse Aardolie Raffinage Maatschappij N.V. (Iranian Oil Refining Co.). They have been registered in Iran, where their management and operating headquarters are located. The shares are held by Iranian Oil Participants Ltd., whose head offices are in London. Iranian Oil Services, Ltd., with headquarters in London, has been formed to provide the operating companies with services outside Iran, such as purchasing of equipment and supplies, overseas recruiting of personnel and technical advice.

The operating companies are solely responsible for exploration, production and refining of crude oil in a defined area in south Iran and for the operation of the Abadan refinery and have the unrestricted use during the period of the agreement of all the fixed asset owned by the National Iranian Oil Co., all of whose shares are held by the Iranian Government. These fixed assets consist of all the properties of the former Anglo-Iranian Oil Co. Ltd. which were taken by Iran at the time of nationalization in 1951.

The function of the operating companies, as the name suggests, is solely to produce and refine crude oil, for which each is paid a fee of one shilling per cubic meter (approximately 2.2 cents U. S. barrel) plus their operating costs. Fees and operating costs are paid by "Trading Companies" which are subsidiaries of and represent the Consortium members and deal individually and independently of each other in the purchase and sales of oil in Iran for export only.

Purchases of crude oil and products are made from the National Iranian Oil Co. which, in addition to its requirements for internal consumption, has the right to purchase 12-½ percent of the remainder of the crude oil produced, and to dispose of it as they wish, with the further provision that, if NIOC do not want to take the whole of it, the Trading Companies must take it and pay the full market price to NIOC.

The ultimate financial effect of the agreement is, that the net profits of the Trading Companies arising from their operations in Iran are to be shared equally between the group of individual Trading Companies and Iran.

The National Iranian Oil Co. (NIOC) now holds all the shares of the Iran Oil Co., which is active in certain areas of Iran, outside the area covered by the Consortium agreement. Among these interests are the Naft-i-Shah oilfield and the Kermanshah refinery, which supply part of the internal requirements of the country. NIOC is also responsible for handling the entire internal distribution and marketing of oil products in Iran, whether derived from the Kermanshah refinery, or refined in the Abadan refinery by the operating company.

It also can engage in the marketing of its proportion of the crude oil, i.e. 12-½ percent, produced by the Exploration and Producing company, so its activities include exploration, production, refining, distributing and marketing. With regard to its exploration of crude oil, rumors have been rife that the Consortium companies have sought to influence NIOC's choice in the sales of this product. These rumors the Consortium companies deny, and state that NIOC is free to sell this oil wherever it may choose and that they have not the slightest intention of interfering in this. In addition, if NIOC wishes to export products it is perfectly free to approach any of the trading companies with a view of making a satisfactory arrangement for this purpose. NIOC is at present negotiating with one Italian company and has recently signed a sales agreement for 200,000 tons of crude and 50,000 tons of products to the Japanese Company Indemitsu before the end of 1955.

Putting Abadan on Stream: Only certain of the units in the Abadan refinery were run during the three years prior to Oct. 29, 1954, but Iranian engineers who remained in the refinery carried out maintenance with great care during this period and so the plant generally was kept in good condition.

When the Iranian Oil Refining Co. took over, to put the refinery into production, each unit was thoroughly overhauled before putting on stream, i.e., it was opened up, inspected, cleaned, any defective parts replaced and all instruments checked, so that it could be put on stream for continuous operation.

This recommissioning is being carried out by a force of 3,000 specialized workmen under the refinery maintenance department which employs highly competent engineers, 300 of which are Iranians and 50 expatriates, the chief of this department being Mr. Roth, an American from Oklahoma, who's chief assistant is an Iranian engineer, Mr. Ganjavi.

In addition to 11 routine overhauls, 50 major overhauls have been completed since the effective date, which include five distillation units, 13 refining units (washeries and chemical plants), nine cracking plants (including the cat cracker) seven special products units—among which are alkylation units for the production of aviation gasoline—14 utilities units producing water, steam, gas, electricity, and two clarifiers. Twenty-eight further major overhauls are scheduled to be carried out by the end of 1955 and 78 more during 1956 so that by the end of that year, units representing 80 percent of the refinery's total equipment will have had a major overhaul.

The overhaul of one of the large distillation units, Bench 65, took 9,075 man days, and that of the cat cracker took 24,000 man days, it having just been completed and was due to go on stream in October.

No. 3 alkylation unit is now in course of overhaul, the estimated labor required being 25,500 to 27,500 man days.

Automation has been largely installed in this unit, so that its continuous feed pumps, furnaces, exchanger, columns and reaction chambers work automatically under supervision of a small operating staff.

In addition to the distillation unit which was operating at the time of take over, three more distillation units have been put on stream and are now putting through 155,000 b/d. The luboil plant and the bitumen plant are workinfi to supply the needs of the internal market for these products as is one of the smaller alkylation plants for the production of aviation gasoline for the home market.

In addition to the starting up of the cat cracker, the large alkylation units will shortly be started up to provide high octane components for aviation gasoline.

The 60,000 kw power house and the water treatment plant, with a daily production of 9.5 million gallons of drinking water are supplying not only the refinery, but the Abadan community as well with these commodities.

The Consortium companies are endeavoring to raise the throughput of the refinery to 240,000 b/d in the spring of 1956 and to 300,000 b/d by the end of 1956.

At the end of August 1955 the following units had been put into operation at Abadan, with a daily throughput of crude oil of 155,000 b/d:

2 Atmospheric Crude Distillation Units
2 Vacuum Distillation Units
1 Re-distillation Unit
1 Aviation Spirit Re-run Unit
3 Gas Fractionation Units
1 De-propanizer Unit
1 Alkylation Unit
2 Super Fractionating Units
1 Reforming Unit
2 Sulfur-Dioxide Extration Units
1 Sulfur-Dioxide Manufacturing Unit
1 Furfural Extraction Unit
1 M.E.K. De-waxing Unit
1 Clay Contacting Unit
10 Washeries for Various Products

When Abadan refinery was being operated by Anglo-Iranian Oil Co. Ltd. it had a throughput capacity of about 500,000 b/d so it is now running at a little less than one-third of that capacity, that is, at about the quantity the consortium companies set as a target, without guarantee.

From the units now in operation, it will be seen that practically a full range of products is being turned out, i.e., gasoline, kerosine, gas oil, fuel oil and lubricants, a large portion of which is being exported. A certain amount of aviation gasoline is also being made, but at time of writing, this has all been used for internal consumption; it is possible however that when the cat cracker goes on stream some of its products will be used to increase production of aviation gasoline, and thus leave a margin of that product for export.

While the target for 1956 calls for a refinery throughput of about 210,000 b/d, no estimate has, as yet, been published by the consortium companies as to when this throughput will be attained, as in addition to the cat cracker going on stream, further atmospheric and vacuum distillation units will have to be started up, as well as the subsidiary distillation and treating units.

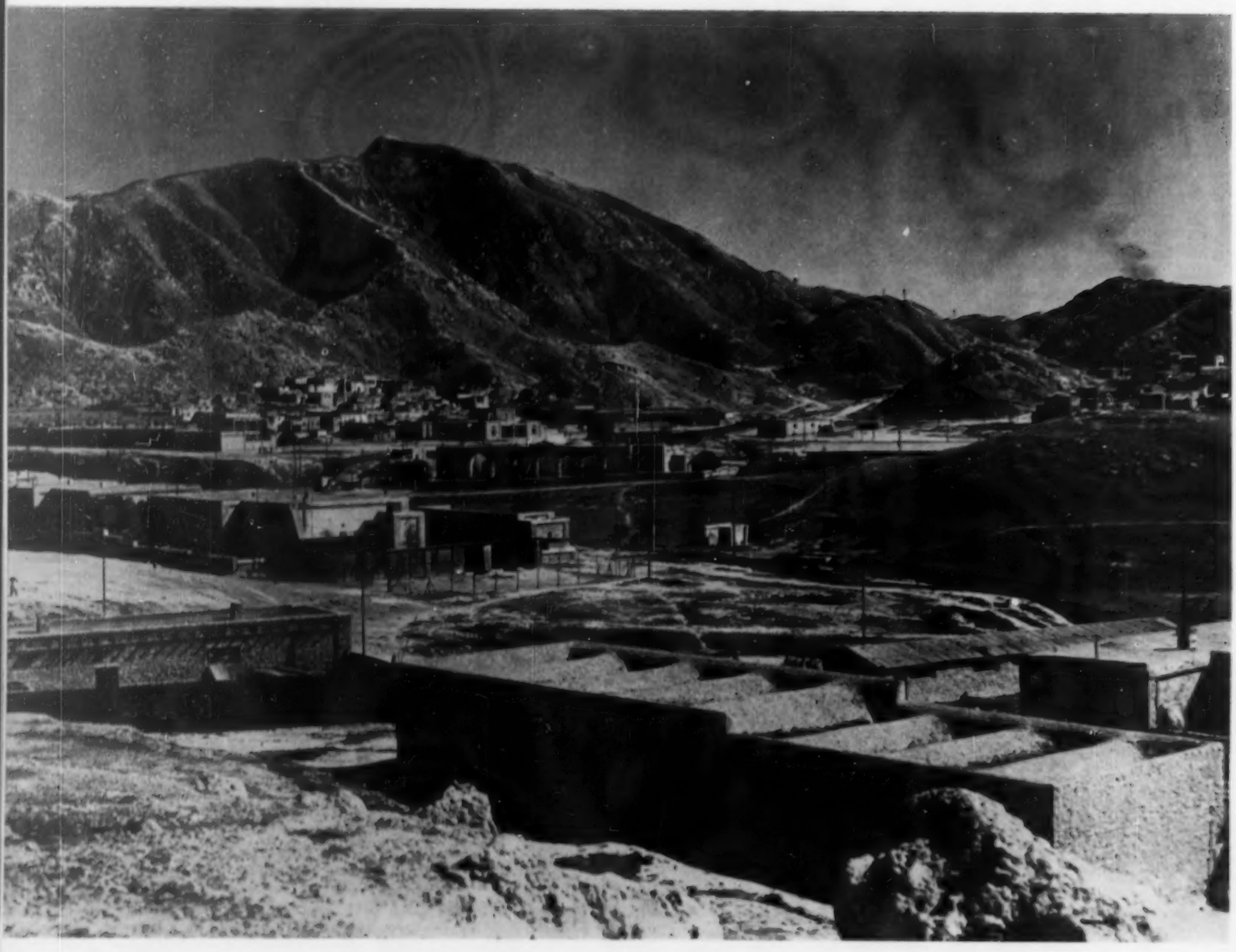
CONDITIONS IN IRANIAN OIL RESERVOIRS

WHEN IRAN nationalized its oil industry and the Anglo-Iranian Oil Co. Ltd. ceased operations in that country in 1951, operations in the various fields virtually ceased. Production dropped from 700,000 b/d to about 20,000 b/d for internal consumption.

The question naturally arose as to the effect that a long term shut-down would have on the oil reservoirs in the developed fields.

Light was shed on this question at the recent Fourth World Petroleum Congress held in Rome. A paper on "The Effect of Production Restriction on Iranian Oil Reservoirs" was prepared for the Congress by W. J. Graham, The Texas Co.; George Hetherington, Gulf Oil Corp.; R. E. Old,

No. 1 area, Masjid-I-Sulaiman.



Jr., Socony Mobil Oil Co., Inc.; and Vladimir Tuman, Iranian Oil Exploration and Producing Co. (formerly with National Iranian Oil Co.).

Data for the paper was based on a survey made by a party of representatives of the Consortium companies in 1954 on invitation of the Iranian National Oil Co., which had been operating the fields.

In addition to three of the authors of the paper, M. M. Pennell, the British Petroleum Co. Ltd., and D. R. Horner of the Royal Dutch/Shell Group were also co-authors of the report.

The fourth author of the paper, Vladimir Tuman, was in charge of the collection of data during the period from 1951 to 1954 when NIOC was operating the fields.

The field measurements in late 1954 and the report were the joint effort of the above six people, but the authors stated that no detailed reservoir studies have been possible in the time available.

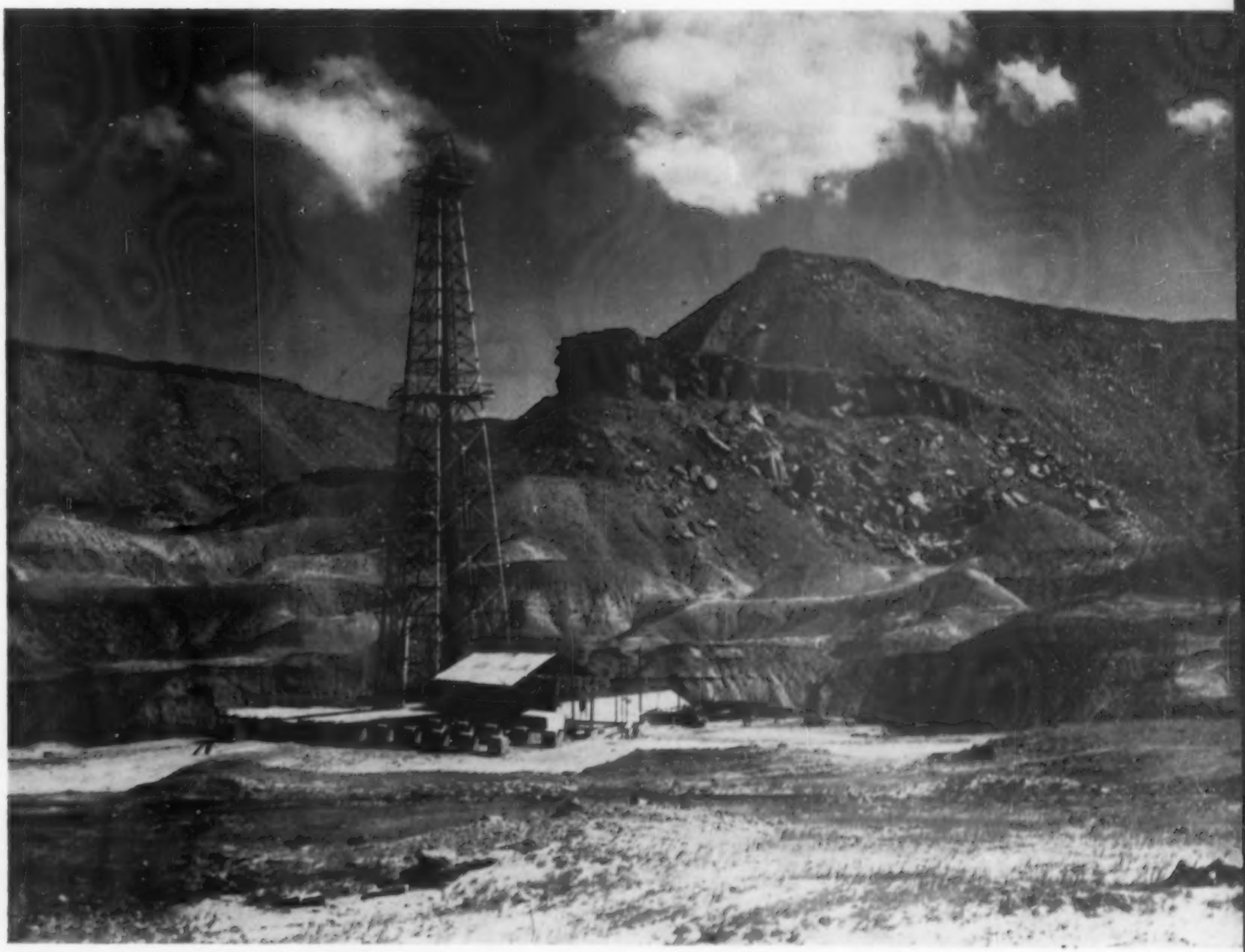
To understand what has happened in the reservoirs during the three years' shutdown, it is necessary to review their general properties and the types of measurement used to control them.

Reservoir Properties: The predominant producing formation of the Iranian oilfields is the fissured Asmari limestone of Miocene and Oligocene age, although some production is obtained from Cretaceous limestone in the Lali field and Asmari-Eocene in the Haft Kel field.

This Asmari limestone is overlain by the Fars deposits (Miocene) which act as a seal for the reservoirs. The actual caprock is predominantly anhydrite from 80 to 140 feet thick.

As is well known, the Asmari limestone is dense and relatively impermeable, but has many fissures, and the practice in the past has been to drill until a fissure is found by mud loss and then to complete the well. When no fissure is found, no satisfactory well completion can take place. No measure of width, volume or frequency of fissures can be made accurately, but in most of the Iranian fields, it is known that the fissure connections between the wells are good, and in spite of the low permeability of the matrix, there is enough flow into the fissures to replenish them at op-

No. 19 well, Agha Jari.



timum production of the well. High well rates are balanced by wide well spacing, which at the present Agha Jari production rate represents possibly less than one percent per year of the oil *in situ*. Thus the whole system seems to be in fairly close pressure equilibrium.

Many of the measurements made by the survey party are those which have been developed in the past, particularly for use in these fields, and are not in general use elsewhere, but have served their purpose excellently for observation of the small changes taking place in the Iranian fields from month to month, i.e. changes of pressure of the order of one psi or one foot in levels.

Masjid-i-Suliman Field: This field was discovered in 1908, the first well being located by Reynolds, and by 1934 gross production from the field was 127,000 b/d. Prior to this date, in 1929, owing to there being no market for a large portion of the Abadan refinery residue, it was injected into the field. By August 1, 1951 the cumulative gross and net production of the field was 1,010 million and 862 million barrels respectively.

The crude had been produced by 115 wells, although the largest number in production at one time was 31. .

By 1941, the bottom hole pressure had fallen to such an extent that wells with high ground elevations did not flow and so the first well was put on gas lift. Dome gas was injected down a two-inch tubing at a rate of about 140 cubic feet per produced barrel of oil. The average lift from the free-oil level to surface was about 1,750 feet.

The field was shut down in July 1951, except for a small amount of oil for local consumption. This rate was raised to about 25,000 b/d in November 1951, and maintained at that rate till November 1954, the net production between July 1951 and November 1954 being 585,000 barrels. Nearly 6,000 mmcf of gas was produced from the secondary gas cap to meet local fuel needs and to gas-lift wells along the northeast flank.

Recent measurements indicate that pressure on the gas cap has fallen slightly. The closed-in wellhead pressure at the single well, where it was measured, fell by 3.4 psi. Pressures in the oil zone rose, in some areas by as much as 14.5 psi.

The gas-oil level rose in all parts of the field, the rise varying between 25 and 50 feet. The oil-water level rose on the northeast flank. On the southwest flank, and particularly at its northwest end, the water level fell. As a result, the thickness of the oil column increased. In the Naftak area the increase was 124 feet to a present thickness of 387 feet.

Lali Field: The Lali area was first examined in 1917, but although it seemed promising, L2 was not drilled until 1938, being completed in June of that year as an Asmari producer.

Later it was deepened and in 1949 completed as a Cretaceous producer, with an initial rate of 9,400 b/d which was later reduced to 4,300 b/d on account of a rapid decline in pressure. It had produced 2,240,000 barrels by July 1, 1951.

A total of 10 wells had been drilled up to August 1951, and two wells were being drilled when the field was closed in. Of these, four wells were Asmari producers and one Cretaceous. The four Asmari wells had a cumulative production of 13 million barrels by this time.

One Asmari well, L-3, was produced at 850 b/d from July 1951 to November 1954, but the other wells were shut in. Pressure on these wells built up after they were shut in, but the build-up varied with different wells. In L-9 it was nearly 100 psi and was apparently still building up in November 1954.

Evidence on the condition of the Cretaceous reservoir is confined to one well. Only a nominal 4,000 barrels of oil was taken from this well during the shut-down period.

Pressure in the well built up by some 65 psi in about 14 months and is practically at the original pressure, indicating an active water drive.

Haft Kel Field: The first well in this field was completed as a producer in 1928. It had penetrated the Asmari limestone 273 feet and had an initial production rate of 5,700 b/d.

By 1946, 42 wells had been drilled or partly drilled, and at time of nationalization, 21 were still oil producers, two of which were not connected to the production units. The rest were either observation wells or mudded-off awaiting work-overs.

Cumulative production at time of shut-down was 1,010 million barrels gross and 1,000 million barrels net.

The champion well, K-22, had produced 90.7 million barrels, but eight others in the field had produced over 50 million barrels each. Wells were limited to a production rate that depended on the flow of the individual well and its proximity to gas or water.

Of the Iranian fields, Haft Kel had the most effective water drive, but it was not sufficient to maintain reservoir pressure at the producing rates in operation from 1943 to 1951, and by then the reservoir pressure had declined to a point where those wells producing to separators at the higher surface elevations would soon cease to flow.

Production from the field at time of shutting down was about 170,000 b/d and an average of 245 b/d was produced from July 1951 to September 1954. Some 6,000 mmcf of gas was produced from the gas cap for local fuel use.

In October 1954, production was increased to 17,000 b/d.

With the field practically shut in, pressures throughout the oil zone and the adjacent water zone tended to equalize, but had reached equilibrium by November 1954.

In all parts of the oil reservoir there was some increase in pressure, and also in the gas cap, but here the pressure rise was less than in the oil zone.

The gas-oil level in the central and southwest domes rose by 100 feet. The rise of the oil-water level was less than that of the gas-oil level, so the thickness of the oil column increased.

Naft Safid Field: This area was first examined in 1909 and between 1913 and 1918 two dry holes were drilled. In 1935, W-3 was completed 12 feet in the Asmari limestone as a gas well producing 18 mmcf/day. W-5 was completed in 1938 at a penetration of 10 feet in the Asmari limestone with an initial production of 19,400 b/d.

During the war all wells were mudded off and drilling suspended. In December 1945, the wells were cleaned and put on production at 11,400 b/d. Drilling continued and production was increased to a maximum of 25,000 b/d. The total number of wells drilled by 1951 was 23: six were connected up for production, five were not connected, while of the remainder, some were used as observation wells, and others mudded-off or suspended drilling operations. Cumulative production by this time had reached 35 million barrels.

Well W-20, located on the southeast pitching end of the field, blew out after penetrating 53 feet of the Asmari limestone. It caught fire on May 1, 1954, and was finally capped on June 11. It was estimated that 15,000 mmcf of gas was burned in this period.

During the period when the field was theoretically shut-down, one high ratio well was produced for fuel gas to supply local demands, and over the period of 3½ years, oil production, which was variable, averaged 500 b/d.

The behavior of the reservoir during this period was complicated, because at the time of shut-down it had not recovered from the effects of the blow-out of W-20. Pressure in the oil band rose in most cases, but fell slightly in others, while pressure in the gas cap at the two wells where it was measured, showed decline. The gas-oil level, in the single well where it was measured, showed no net movement. The gas-oil levels calculated from gas and oil pressure gradients in July 1951, and to some extent in 1954, may not be fully reliable because of appreciable horizontal pressure gradients set up by the blow-out of W-20. The oil-water level measured at W-8, the only one useable for this purpose, fell by about 30 feet.

These limited measurements indicated that the thickness of the oil column, as well as the total hydrocarbon volume above the oil-water column, increased, but these indications cannot be considered as final.

Agha Jari Field: The area in which this field is situated was first examined in 1914, but no drilling was done until 1926. The first well, AJ-1, was off the structure to the southwest. The second well, AJ-2, was drilled in 1936 to a depth of 4,936 feet and completed in the Asmari gas-cap. The third well, AJ-3, struck Asmari oil at 8,557 feet in 1939, producing at a rate of 5,000 b/d.

Commercial production began at the end of 1944 at a rate of 57,000 b/d, and at time

A producing well at Haft Kel.

of nationalization the production had been increased to 350,000 b/d. By August 1951 a total of 34 wells had been drilled, and the 20 producers had a cumulative production of 428 million barrels.

Crude from seven of the wells was passed through a four-stage separation unit and then sent as atmospheric crude through a 20/22-inch pipe line to Mashur for exportation. The rest of the crude passed through a seven-stage separation unit and was then dispatched by pipe lines to the Abadan refinery. Study of the Agha Jari reservoir is difficult, owing to the fact that no well in this field has penetrated the oil-water contact.

The major portion of the oil produced in South Iran during the period from July 1951 to November 1954 was taken from the Agha Jari field, the total amount for this period being 30 million barrels. Some 440 mmcf of gas was also produced directly from the gas cap for use locally as fuel.

During this restricted production period, pressures in the wells in the oil band gradually built up, varying from 22 psi where the pressure was lowest to a barely measurable amount where it was highest.

The gas-oil level in the different parts of the field varied, but pressure in the oil zone also rose.

The oil-water level in this field is unknown, but the pressure behavior while the field was in restricted production indicates a feeble or non-existent water drive.

Gach Saran Field: The Asmari reservoir in this field is the largest yet discovered in Iran, its current proved limits being 22½ miles long and four miles wide, but the possible extent is 28 miles long by about six miles wide.

The area was first examined in 1924, and the first two wells, GS-1 and GS-2, began drilling in 1927, but were abandoned at depths of 3,641 and 4,405 feet respectively.

GS-3, the discovery well, was spudded in in January 1928, blew out when 37 feet in the caprock, and was then abandoned until 1937 when it was deepened in to the Asmari. It was completed at 3,367 feet and gave an initial production of 26,000 b/d.

Commercial production began from four wells at a rate of 8,500 b/d. This rate was increased to 38,500 b/d from three wells in 1945, and later to a production of 42,000 b/d from four wells in 1951.

At the time of nationalization, the cumu-

The Karun River at Lali.

No. 1 well at Lali.

lative production from the field was 131 million barrels, and there were never more than four wells producing simultaneously.

To date, 15 wells have been drilled in the field, eight of which were completed as Asmari producers.

The fissure system of Gach Saran does not appear to be uniform, wells on different flanks varying widely in their potential production capacity.

During the period of national operation, Gach Saran produced 170,000 barrels of oil and 2,168 mmcf of gas from wells GS-13 and GS-4, respectively, for local consumption. The average producing rates were 140 b/d of oil and 1.8 mmcf of gas.

Since 1941 only the wells in the southern half of the field were produced.

After the field was closed-in in July 1951, pressure rose rapidly until May 1953, and subsequently the rise became more gradual. The only well in which the pressure was measured during NIOC working was GS-3, which showed a 14 psi rise.

The present position of the gas-oil interface is unknown, as is the oil-water level, as no well has yet penetrated the water.

Based on the above facts, it would appear that the prolonged closure of the Iranian fields has had no deleterious effect on their production capacities and it also has enabled the oil engineers who are now interested in future production to program their operations with a greater degree of certainty.

DESCRIPTION OF IRANIAN OIL FIELDS

	Masjid-i-Sulaiman	Lali		Haft Kel	Naft Safid	Agha Jari	Gach Saran
		Asmari	Cretaceous				
Year of discovery	1908	1938	1949	1928	1935	1936	1928
Commercial production commenced	1911	1948	1949	1929	1945	1944	1940
Proved productive areas, square miles	45	40	17	30	30	61	30
Surface elevation, feet above sea level	800-1900	500-1400	500-1400	800-1500	300-1400	340-1340	2100-2500
Producing formation	Asmari Limestone	Asmari Limestone	Cretaceous Limestone	Asmari-Eocene & Cretaceous Limestone	Asmari Limestone	Asmari Limestone	Asmari Limestone
Depth to producing formation, ft.	640-3600	4000-7000	7300-9000	1900-4000	3000-6000	4900-9800	2800-6150
Elevation, top of structure	10,200	7000	3500	9150	7670	6000	9800
Stratigraphic thickness, ft.	1,000	1200	1700	900	900	1000	1550
No. of production wells, 1/1/55	32	5	1	21	11	21	4
No. of observation wells, 1/1/55	25	4	Nil	17	5	3	2
Cumulative net production in million barrels 1/1/55	864	14	2	1005	36	466	131
Original specific gravity at 60°F.	0.8293	0.847	0.847	0.836	0.848	0.852	0.865
Original gravity A.P.I.	39.1	35.6	35.6	37.8	35.4	34.6	32.0
Original gas oil level:							
(a) Northwest dome	None	5733	Unknown	7800	5558	—	9275
(b) Central dome				8985		Unknown	
(c) Southeast dome				8935		5390	
Original oil-water level elevation:							
Northeast flank	7800 est.	4200	1980	6910	?	Unknown	Unknown
Southwest flank		3500			4440		

World Crude Output Passes 15 Million Barrels Daily

WORLD production of crude petroleum exceeded 15 million barrels daily for the first time during the third quarter. Average output was 15,100,800 b/d according to reports gathered by WORLD PETROLEUM. Some figures for the month of September are estimates.

Principal contributors to the increase in output in the third quarter were Canada and Venezuela. Canadian output averaged 374,200 b/d in the period compared with 309,500 b/d in the second quarter and 315,700 b/d in the first quarter.

Venezuela production rose in anticipation of the colder season when fuel oil demand will be better and in response to excellent industrial and shipping demand for fuels. Venezuela's share of the world's oil supply was 14.3 percent in the third quarter compared with 13.8 percent last year.

United States production has been slightly lower during the third quarter, averaging about 6,655,000 b/d compared with 6,721,600 b/d in the second quarter. The country's share of world crude production continues to fall. In 1953 the U.S. dropped below 50 percent for the first time. Last year 46.4 percent of the world's oil came from the U.S. and in the third quarter of this year the percentage had dropped to 44.1 percent. Although Canada and Mexico both have had substantial increases these have not been enough to make up for the U.S. drop. North American percentage of the world's production was 50.4 percent in 1953 and currently is down to 48.2 percent.

South America now is producing 16.5 percent of the world's crude oil compared with 16 percent in 1953.

Of the total increase of 3.8 percent in the eastern hemisphere's share of oil supply in the past two years 2.8 percent has gone to the Middle East. The Persian Gulf area supplied 18.9 percent of the world's oil in 1953 and 21.7 percent during the third quarter this year. The rise was not as great as the drop in U.S. relative output.

In the third quarter there was virtually no change in Middle East crude output. Average was 3,272,800 b/d compared with 3,274,700 in the second quarter. There was some shifting between various fields. Iran continued to produce more oil as the Consortium of oil companies smoothed out their operations. Kuwait output was a little lower, dropping from 1,156,000 b/d in the June quarter to 1,071,300 b/d in the September quarter. Saudi Arabian output was up about 15,000 b/d and Iraq was 41,000 b/d higher.

In Europe French and German output continued to rise as did estimated USSR production. In Oceania and the Far East there has been little change.

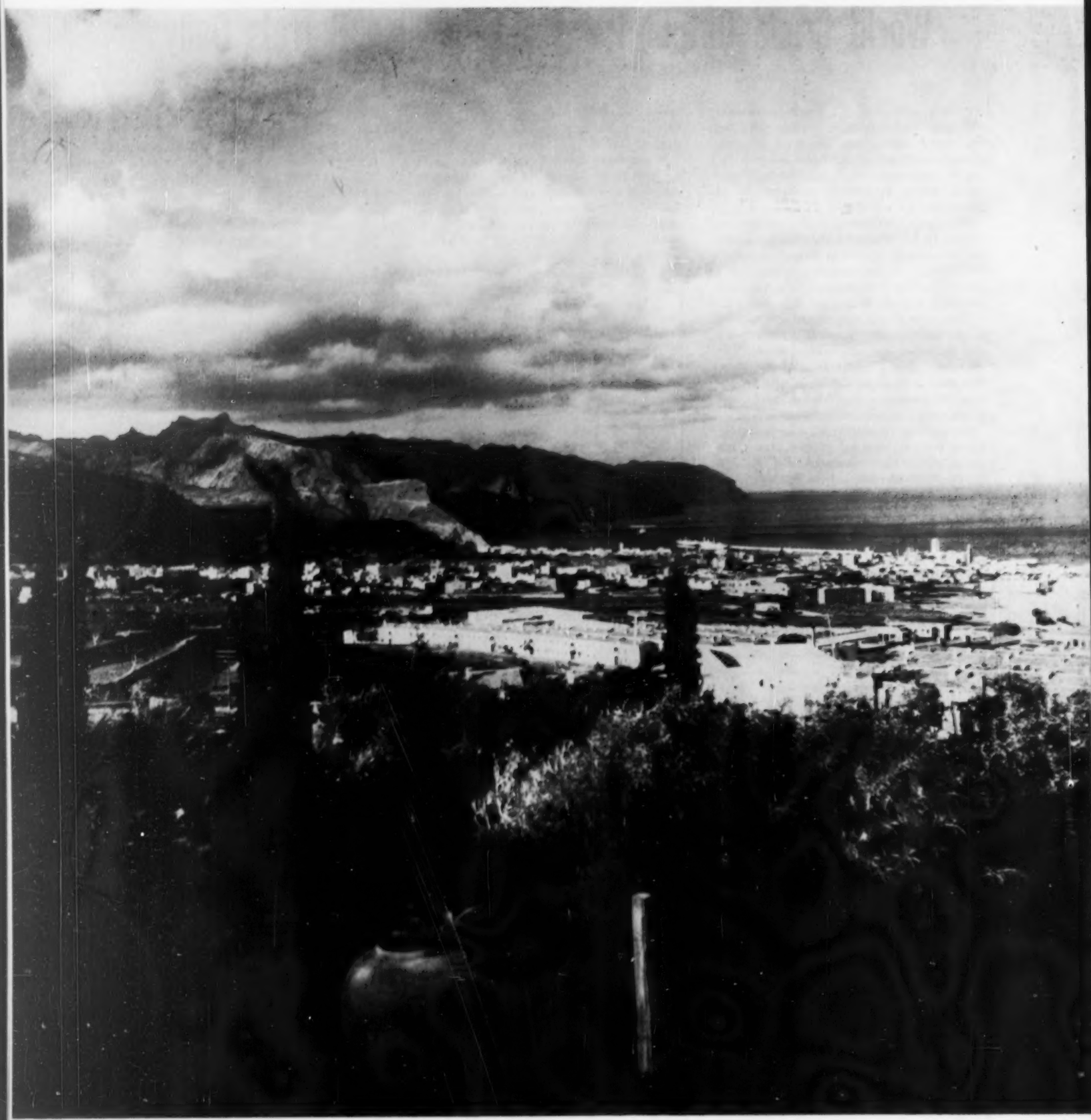
PERCENTAGE DISTRIBUTION OF WORLD CRUDE PRODUCTION

Principal Countries	Third Quarter 1955	1954	1953
USA	44.1	46.4	49.5
Venezuela	14.3	13.8	13.5
USSR	8.8	8.4	7.9
Kuwait	7.0	7.0	6.5
Saudi Arabia	6.3	6.9	6.5
Iraq	4.6	4.6	4.4
Iran	2.3	0.4	0.2
Canada	2.5	1.9	1.7
Mexico	1.7	1.7	1.5
Indonesia	1.5	1.6	1.6
Principal Areas			
North America	48.2	50.0	50.4
Middle East	21.7	20.4	18.9
South America	16.5	16.3	16.0
Europe & Africa	12.0	11.1	10.3
Far East & Oceania	2.4	2.5	2.5
Eastern Hemis.	35.2	33.7	31.4
Western Hemis.	64.8	66.2	68.6

WORLD CRUDE OIL PRODUCTION

(Thousands of Barrels Daily)

	1955 Third Quarter	1955 Second Quarter	1955 First Quarter	1954 Year	1953 Year
United States	6,655.0	6,721.6	6,824.0	6,346.0	6,465.7
Canada	374.2	309.5	315.7	262.7	221.6
Mexico	255.0	256.6	248.3	226.8	198.5
Total N. America	7,284.2	7,287.7	7,388.0	6,835.5	6,885.8
Venezuela	2,156.9	2,086.7	2,135.2	1,897.2	1,765.1
Colombia	107.5	107.1	105.3	109.5	110.4
Argentina	83.5	82.9	81.5	81.3	78.5
Trinidad	67.5	67.0	66.0	65.0	61.2
Peru	46.9	47.0	47.0	46.7	44.0
Ecuador	9.4	9.0	9.8	8.4	8.1
Chile	7.5	6.5	6.0	4.8	3.5
Brazil	6.0	5.7	5.2	2.6	2.5
Bolivia	8.4	7.0	6.7	4.5	1.6
Cuba	1.2	0.6	0.5	0.2	0.1
Total S. America	2,494.8	2,419.5	2,463.2	2,220.2	2,075.0
WEST. HEMISPHERE	9,779.0	9,707.2	9,851.2	9,055.7	8,960.8
Austria	68.2	60.0	60.0	62.0	60.0
Germany	63.5	60.5	55.6	51.8	42.3
Netherlands	19.5	19.5	18.9	17.8	15.6
France	20.0	12.0	12.0	9.8	7.0
Yugoslavia	3.0	3.0	3.0	4.2	3.0
French Morocco	2.2	2.5	2.5	2.4	2.1
Italy	3.8	2.8	2.8	1.5	1.8
Algeria	1.2	1.5	1.5	1.6	1.8
United Kingdom	1.2	1.2	1.2	1.2	1.1
Total Europe & Africa (Excluding USSR)	182.6	163.0	157.5	152.3	134.7
USSR	1,325.0	1,270.0	1,215.0	1,145.0	1,040.0
Romania	150.0	150.0	150.0	150.0	140.0
Hungary	14.0	14.0	14.0	14.0	14.0
Poland	4.0	4.0	4.0	4.0	4.0
Albania	6.0	6.0	6.0	3.0	3.0
Czechoslavakia	2.5	2.5	2.5	2.5	2.5
Total USSR & Sat.	1,501.5	1,446.5	1,391.5	1,318.5	1,203.5
Total Europe & Africa	1,681.1	1,609.5	1,549.0	1,470.8	1,338.2
Kuwait	1,071.3	1,156.0	1,062.4	955.8	862.0
Saudi Arabia	951.9	936.0	951.6	952.6	844.6
Iraq	698.0	657.0	640.0	628.7	576.1
Qatar	114.1	113.0	108.5	104.9	85.2
Iran	350.0	323.4	259.0	56.0	26.8
Egypt	33.0	33.0	33.0	37.7	45.2
Bahrain	30.0	30.5	30.1	30.1	30.1
Neutral Zone	22.0	24.0	24.0	16.5	—v—
Turkey	2.5	1.8	1.8	1.1	0.5
Total Near & Middle East	3,272.8	3,274.7	3,110.4	2,783.4	2,470.5
Indonesia	233.0	240.0	242.2	218.1	206.0
B. Borneo	99.0	99.0	99.0	98.8	101.0
Japan	6.0	6.0	5.9	5.9	4.8
India	7.0	6.5	6.1	6.8	5.4
New Guinea	8.4	10.0	11.7	10.8	5.8
Pakistan	5.0	6.0	6.0	5.0	4.8
Burma	4.0	4.0	4.5	3.4	3.3
China	2.5	2.5	2.5	2.0	2.0
Total Far East & Oceania	364.9	374.0	377.9	350.8	331.1
TOTAL E. HEMISPHERE	5,321.8	5,258.2	5,037.3	4,605.0	4,141.8
WORLD TOTAL	15,100.8	14,965.4	14,888.5	13,660.7	13,102.6



CEPSA's refinery on the south coast of Tenerife Island occupies a magnificent site overlooking the port with its lush tropical vegetation and a background of volcanic rock.

CEPSA enters petrochemical field

By Carl B. Whyte*

Carl B. Whyte, president of Procon Incorporated, has been engaged in oil refining operations and construction since his graduation in 1925 from Georgia Institute of Technology. Working for Louisiana Oil Refining Corp. and Arkansas Fuel Oil Co. at Shreveport for 15 years, he rose through various positions to chief engineer. At the outbreak of World War II he was assigned to take charge of construction of the Maumelle Ordnance Works. When this job was completed in 1953, he became resident engineer and later chief engineer in charge of construction of Cities Service Refining Corporation's Tutwiler refinery at Lake Charles, La. Mr. Whyte resigned from the Cities Service organization in 1946 to become chief construction engineer for Universal Oil Products Co. He was transferred to Procon Incorporated in 1950 as vice president and general manager. Two years later he was elected president.

COMPANIA Espanola de Petroleos (CEPSA) celebrated its twenty-fifth anniversary last year by installing a new UOP Platforming-Udex unit, built by Procon (Great Britain) Limited. It will enable production of aromatic chemical intermediates and higher octane gasolines to satisfy the recent increases in European demand for these products. The Udex installation was the seventh to be constructed and the first outside the United States, making CEPSA's refinery at Santa Cruz the only plant outside the United States which can commercially produce by this process benzene, toluene and xylenes from petroleum naphthas. In July, 1955 CEPSA announced the formation of a new company for manufacture in Spain of ammonia fertilizers, marking their entrance into another phase of the rapidly growing petrochemical field.

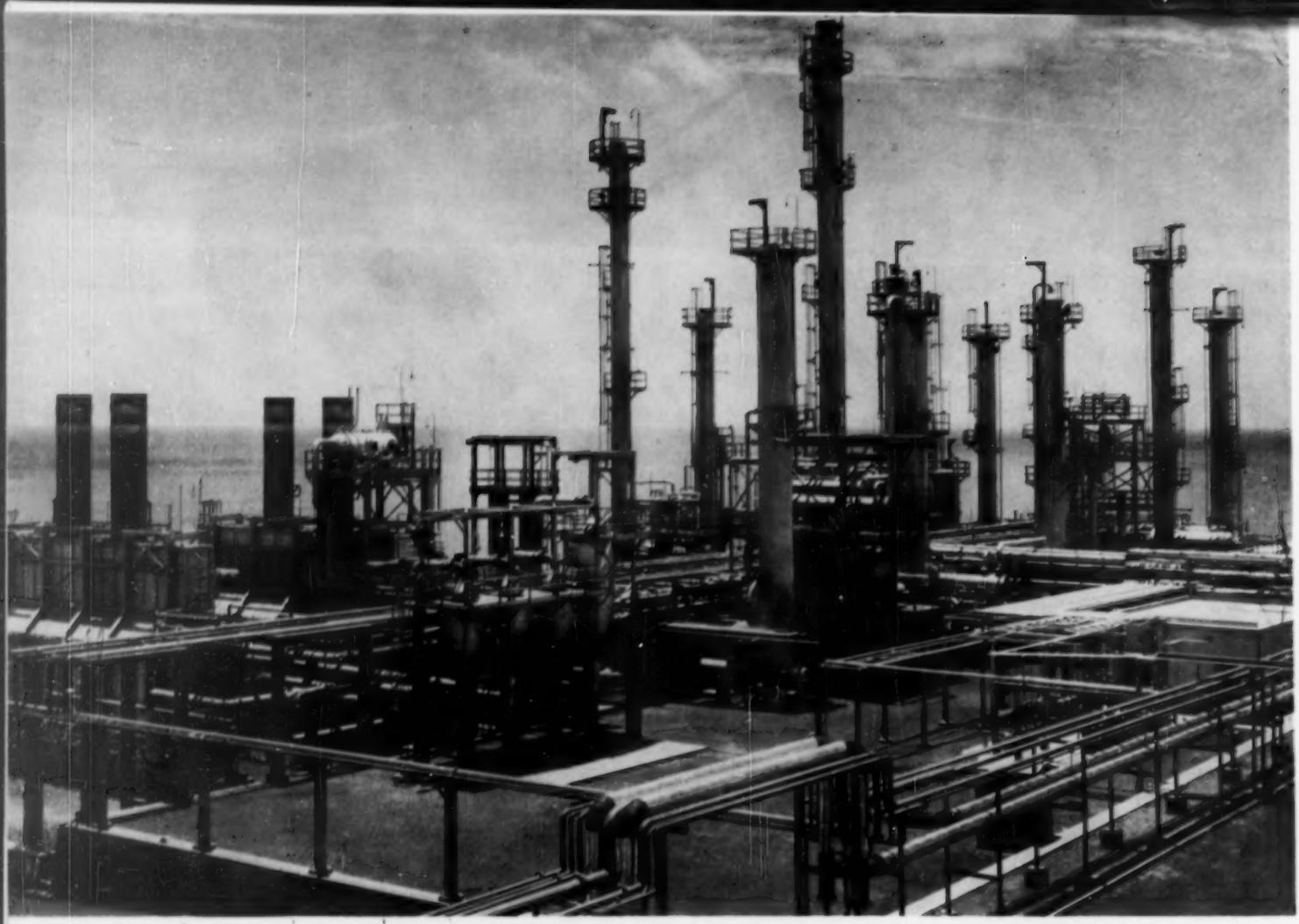
In addition to the Platformer-Udex unit, CEPSA now is building a new atmospheric distillation unit. The refinery now has a daily throughput capacity of 30,000 b/d and produces a full line of products including lubricants, waxes and asphalt.

The present expansion program is the third undertaken by CEPSA in the past 25 years. Cost of the project is $14 million none of which has been contributed by the Spanish government. Foreign funds required for the construction were earned by processing crude for other European companies at Tenerife on a process agreement basis.

CEPSA was first organized in 1929 to hold concessions in Venezuela and Texas and to build the Tenerife refinery on the Canary Islands outside the jurisdiction of the Spanish petroleum marketing monopoly. CEPSA's early trials illustrate the difficulties of establishing a new industrial enterprise in an area where personnel must be trained from the beginning, as well as the problems of integration of the views of the various interests in management. Added to its early troubles was the depression creating the fall in product prices during the 1930's to levels that barely covered taxes. Hardly had the company begun to see its way clear with the rising prices in 1936 when the Spanish Civil War broke out. For the space of a year management was completely isolated in Madrid from the operations in Tenerife. The company successfully resisted the attempts of the wartime leftist government to take over operations and even managed to install cracking facilities, in addition to providing important fuel supplies to the conservative government.

The Civil War was followed closely by World War II and the company found itself faced with a new problem resulting from a 500 percent increase in tanker rates in 1940. Tanker costs became the most important factor in product prices and as a result the company set about building its own tanker fleet. By 1954 the fleet had grown to 50,435 dwt plus one 18,400 dwt tanker under construction. The CEPSA fleet now transports 40 percent of tanker cargoes entering the Tenerife refinery.

The Tenerife refinery is ideally located on the world's sea lanes for economical inshipment of crude from either Venezuela or the Middle East and delivery of finished products for ships bunkers or European and African markets.



General view of CEPSA's Platforming and Udex plant built on two levels overlooking the Atlantic.

Another complication arose during World War II as a result of the political position of Spain as a neutral. Tenerife was subject to British and United States decision regarding international trade. At one time a sudden decision in Washington resulted in a nearly complete shutdown, when the only crude available was from a German tanker which had taken refuge in the Las Palmas harbor. The cargo was described as 75 percent asphalt, but by intensive refining it supplied temporarily the gasoline requirements of the Canary Island.

With the end of the war, CEPSA fulfilled long-standing ambitions to expand marketing facilities to Morocco (at Ceuta), increase storage facilities at Las Palmas and begin exploration on the Spanish mainland, as well as in Venezuela. Five wells totaling 26,248 feet, at a cost of 35 million pesetas (US $875,000) have been drilled in Spain to date. Originally CEPSA worked with Socony-Vacuum and later alone. So far no oil discoveries have resulted.

At present the company is developing a wildcatting plan in the north of Spain based on geophysical studies. First test found gas at a pressure of well over 3,000 psi. The gas discovery caused a rapid rise in the prices of CEPSA shares, an advance of 70 percent taking place in a single month.

In Venezuela expenditures of three million bolivares have resulted in the exploration of some 15,985 acres and completion of seven exploratory wells, all gassers except one. No crude discoveries have been made, but the company terms its prospects in Venezuela encouraging. In addition to the exploratory holdings, CEPSA has a five percent interest in Lake Maracaibo production of about 2,000 barrels daily.

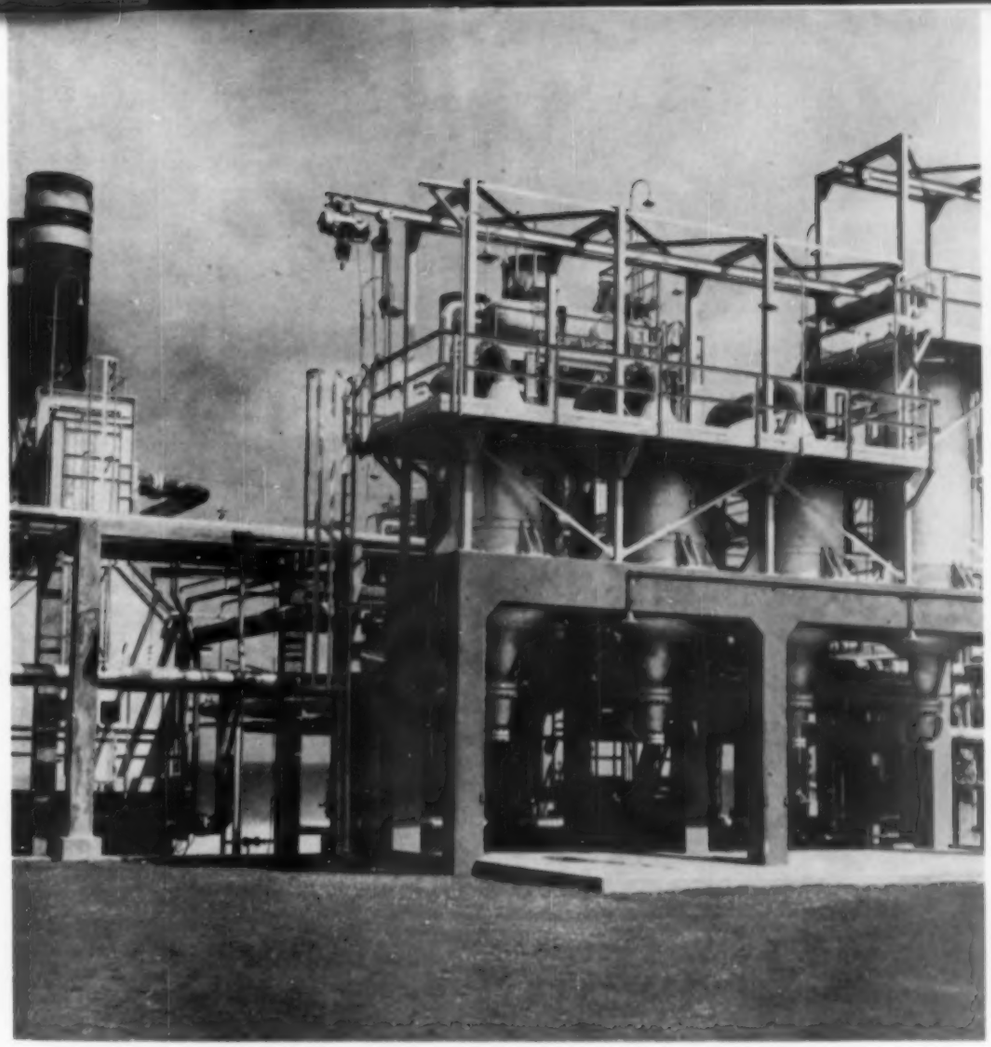
Although located off the coast of Africa, Tenerife is generally bracketed with European refinery activities. Completition is with European companies.

Prior to 1939, total European refining capacity was approximately 380,000 barrels daily. A considerable part of this was destroyed during the war, but the refiners, given a hypodermic of American dollars through the Marshall Plan, accomplished in remarkably fast time a reconstruction program which by 1948 had lifted total refining capacity to about 480,000 barrels per day. Spurred by a soaring demand for petroleum products as European economies became more stabilized, refiners abroad continued their headlong race to build, until the first of this year still capacity reached 2,400,000 b/d.

Refiners such as CEPSA and those in Western Europe, are now face to face with the necessity of equipping their plants with the most modern processes.

Competition for local markets, dictated by the necessity of improving the quality and octane ratings of their gasolines, is not the only factor spurring eastern hemisphere refiners to install better facilities to make better products. Governments of some nations have imposed restrictions on the amounts of tetraethyl lead which can be blended into gasolines, in order to save foreign exchange. This has brought about the need to install processes which produce higher octanes and therefore do not need too large amounts of TEL. A fourth factor, fraught with unlimited possibilities, is the desire to seek new products from petroleum, and refineries are taking a long look at petrochemicals as a major outlet.

What lies ahead for petrochemicals in the European scheme of refining may well be summed up by a quotation from a brochure



Close-up of reactors and one of the two heaters.

distributed recently by CEPSA which states: "Once you commence in this sector of human activity, it is impossible to determine where the road will end." CEPSA hopes that its new Udex plant and the proposed ammonia plant will form the basis for a petrochemical industry to help improve the economy of Spain. That nation's economy suffered near disaster in the civil war of the 30's and, subsequently, in World War II. These events, combined with strictures on trade, brought the import of new automobiles virtually to a standstill. Local mechanics improvised to keep what automobiles still were operating in Spain in running condition. These older cars, and the first autos imported after World War II, did not require high octane gasoline, and CEPSA was able to meet the requirements.

With a revival of Spain's economy in the early 40's, imports of new automobiles grew rapidly. CEPSA, like refiners the world over, found itself facing the problem of meeting increasing demand for higher quality motor fuels with refining equipment not generally suited to the task.

Faced with the need of producing higher octane motor fuels, and sensing that there would be an increasing demand for aromatic hydrocarbons, on which the Korean War had put a premium, CEPSA conducted an exhaustive analysis to ascertain the end products it wished to market. It saw a good market ahead for benzene, toluene, and xylenes, which are produced in catalytic reforming, and chose a combination UOP Platforming-Udex unit as the best method for achieving its ends.

The unit has been erected on a 210 by 360 foot plot disposed in two different levels facing the south coast of Tenerife Island. The lower level is occupied by the Platformer heaters.

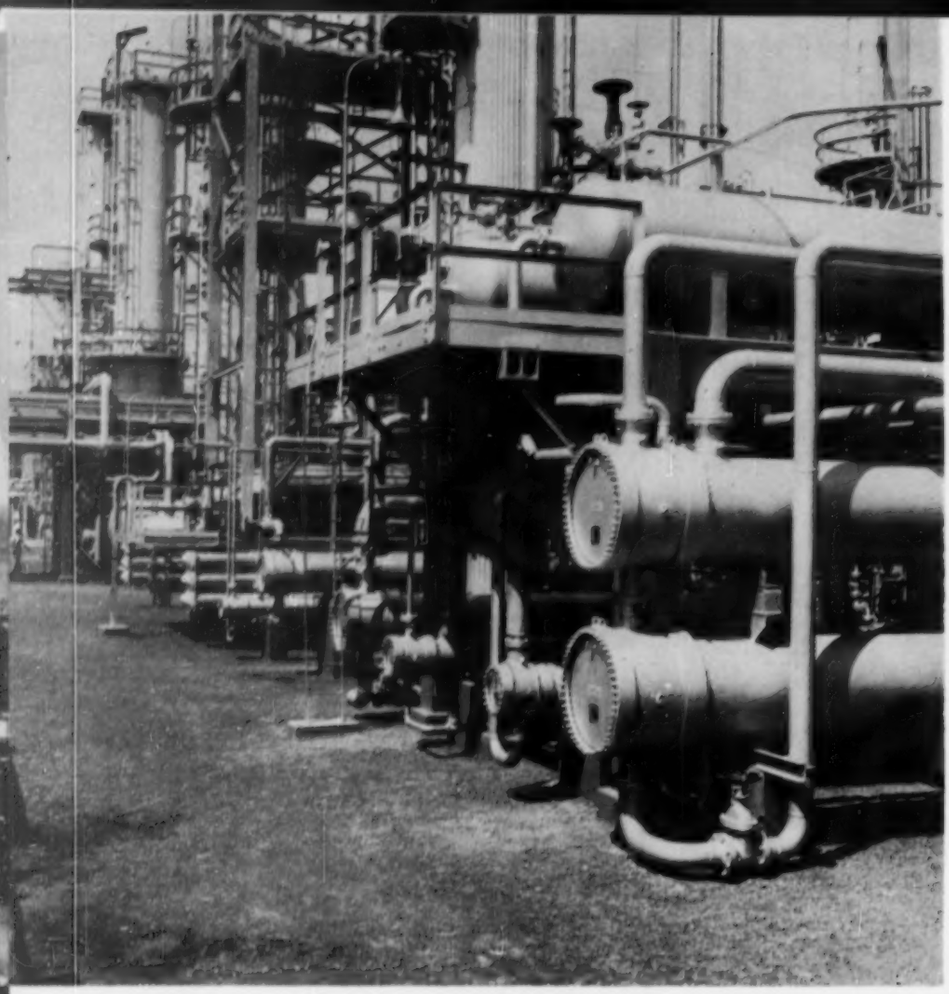
All vessels, exchangers and piping have been cladded with corrugated aluminum. The brilliant metal covering the 230-foot towers makes a dramatic contrast with the background of volcanic rock and tropical vegetation.

Hydrogen compressors are driven by diesel engines, one of the first Platformers to employ prime movers of this character.

The 500 barrel per stream day Udex unit is integrated with a 5,000 barrel per stream day UOP Platformer. The latter unit is operated on a blocked-out basis, and for 25 days each month the Platformer produces high octane gasoline blending components and for five days it produces charging stock of the Udex unit.

When operating to produce motor fuel, the Platforming unit's charging stock consists of straight run gasoline derived from Kuwait crude. Distillation range of Kuwait naphtha charge is 170 to 400°F and the average yield is 92 percent. The Udex charge stock is produced by Platforming naphthas derived from Venezuelan crude. Thus far aromatics have been obtained from a 150-220°F naphtha cut from Oficina crude. Twenty-five percent of the 500 b/sd design capacity consists of benzene; 21 percent toluene and 54 percent non-aromatics. The unit is producing 225 b/sd nitration grade aromatics of which 126 b/sd are finished benzene and 99 b/sd finished toluene. It is the company's intention to produce xylenes also. This will require some changes in the character of naphtha charging stock. The 275 b/sd of raffinate contains less than two percent aromatics, and this raffinate is used in the gasoline pool.

The plant has operated to obtain more than 95 percent recovery of aromatics from



Towers and insulated piping are cladded with corrugated aluminum.

the feed. Stocks of aromatics now are being accumulated so that commercial shipments in quantity can be begun within the next few months.

Despite such an extensive modernization program as embodied in the installation of the Platforming-Udex unit, CEPSA has its eye firmly fixed on the future of petrochemicals. To this end, the company already has embarked on the first phase of an expansion program which includes the construction of new crude processing and distillation facilities. Procon (Great Britain) Limited again has been chosen by CEPSA to do this important work.

Before the war, Western Europe was dependent upon coal as the principal source of energy. Energy meant survival after the cessation of hostilities in 1948 and the use of coal and gas was doubled to meet the demand. Industrial output in Western Europe in 1951 was more than one-third higher than in pre-war years, and oil was an important factor in filling the gap between energy demand and inadequate coal output. It has been said that the petroleum industry saved the situation by taking up this slack, and it was the dominating factor in bringing about the substantial increase in industrial activity which that part of the world now enjoys. Without oil, the present high production figure in Western Europe could not have been attained.

European refineries are turning to catalytic reforming in increasing numbers as the best way to produce better quality and higher octane gasolines than were thought possible a decade ago. As recently as 1950, Europeans were fueling their cars with a 70 leaded octane regular motor fuel. Now the average is in the neighborhood of 84, and it is expected that by next year the leaded octane requirement for "house brand" gasolines will be about 86.

Gasoline is not the only product being improved by new refining facilities. Better diesel fuels already are being produced, some of them through the UOP-licensed Unifining process, making the dieselization of railroads and trucking industries more attractive. By refining their crude oil with better processes, foreign refiners are making available improved burning oils to heat homes and provide a less expensive source of energy for industry.

Better products from petroleum also are certain to have far-ranging effects upon agriculture not only from the standpoint of providing the energy to propel mechanized equipment, but also of furnishing various chemical products such as fertilizers, insecticides, weed killers, and a host of other products which have caused a complete revolution in agricultural methods in the United States.

Hydrocarbons supplied by petroleum are vital to the manufacture of such general-purpose insecticides as DDT, BHC, Chlordane, and Aldrin. Spectacular results have been obtained by large-scale use of these insecticides. Aldrin, spread from low-flying planes, has routed invasions of locusts in the Middle East. In fact, there is one instance where locusts were completely eliminated from 53,000 acres by the use of this material.

In addition to providing untold peacetime products from petroleum, European refiners with their improved processes also will stand as guardian for their nations should war come again. They will be in a position to quickly convert their production from peacetime uses to that of making jet fuels for fighter and bomber planes.

The vast field of petrochemicals is virtually untouched in Europe, but refiners are coming to the realization that in this new industry lies the hope for further strengthening of their national economies. The future of the petrochemical industry is, at the moment, unlimited, and the requirements for products are now so great that they can no longer be met from sources which were formerly the sole suppliers. The war and the emergence of the petrochemical industry in the United States have gone far to increase the demand for aromatic hydrocarbons beyond which Europe is able to supply through its coal industry.

By adopting catalytic reforming so widely in an effort to improve product quality, European refineries have laid the groundwork for establishing a petrochemical industry of their own. Widespread installation of the UOP Platforming process is a notable step in this direction, and Procon Incorporated, through its overseas affiliate, has had an important part in installing this pioneer catalytic reforming process.

Platforming provides an excellent source of aromatic hydrocarbons which form the basic raw materials for many petrochemicals as well as for improving the octane numbers of gasoline. Integrated with a Udex unit, such as CEPSA has done, a refiner can quickly establish himself as the supplier of materials upon which a petrochemical industry can be built. Such a new industry cannot help but have a far-reaching effect on raising the standards of living and providing a great variety of new jobs.

Refiners in France, England, Belgium, Germany, Italy, are improving their facilities and products also through utilizing the UOP Catalytic Condensation Process using the UOP polymerization catalyst for the production of motor polymer gasoline, dodecylene (propylene tetramer) and isopropylbenzene (cumene), the latter two of which are basic petrochemical raw materials.

Through its new construction program CEPSA is preparing for a second quarter century of growth and development of new products to meet the needs of modern Spain.

WHAT'S THE SHAPE OF THE HOLE?

There comes a time on every well when "it's money in the bank" if you know the shape of the hole. A cavity here . . . a mud cake there . . . in other places the hole to gauge. All this, you see at a glance on the **Schlumberger Section Gauge** Survey—information which is often essential for testing, cementing and log interpretation.

The Schlumberger Section Gauge gives you details about the hole size to a diameter of 36 inches. Its dependable operation has guided thousands of operations to successful completion. When in doubt, call your Schlumberger Engineer. It's best to be sure on every survey.

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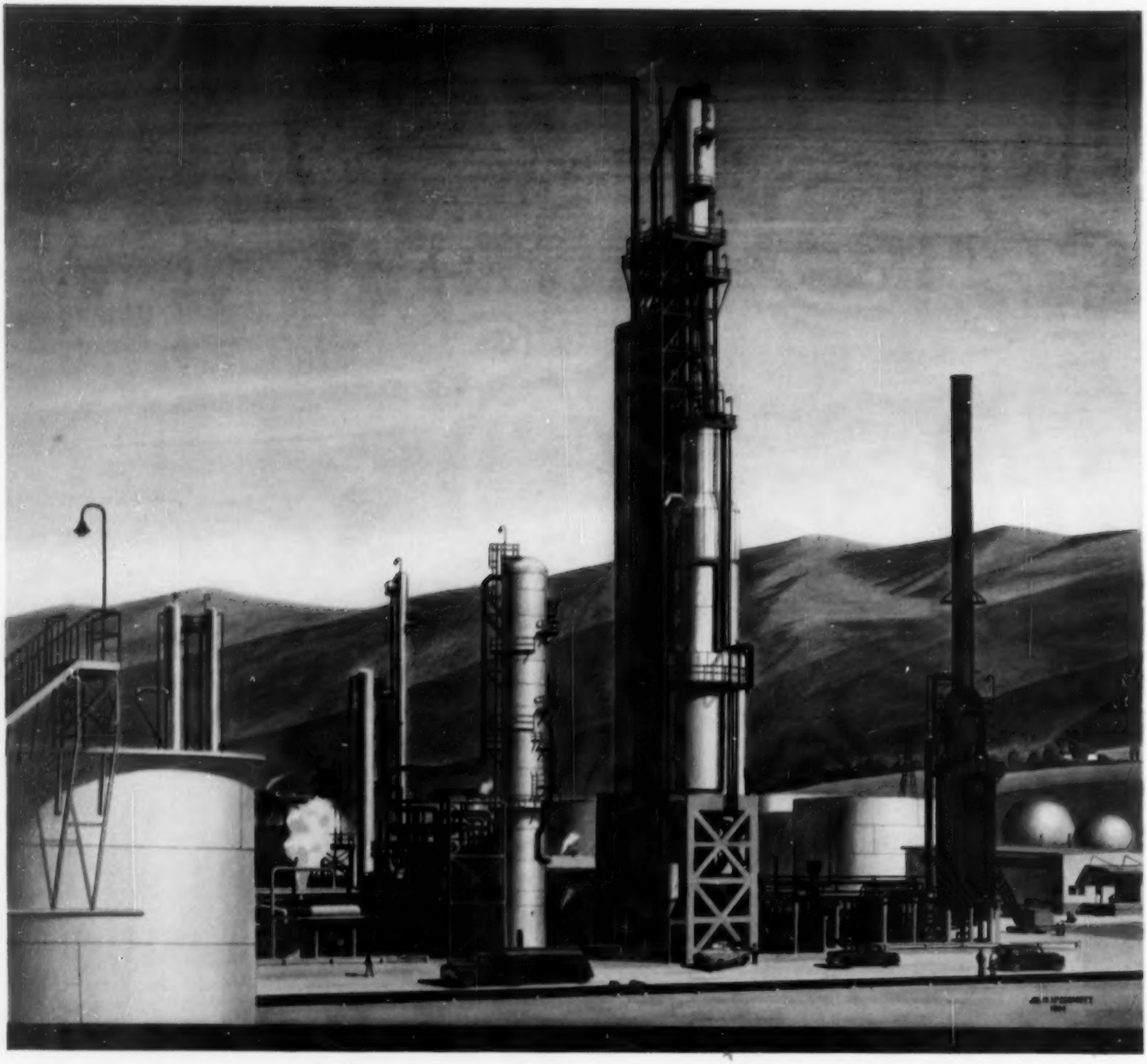
THE EYES OF THE OIL INDUSTRY



SALT LAKE REFINERY

The Houdriflow Catalytic Cracking Unit of the Salt Lake Refining Company has been consistently handling charge rates well above the 13,000 BPSD design reactor charge rate since going on stream in 1950. In 1952 this installation served as a test unit for studies in catalyst travel. Radioactive beads were introduced into the reactor, and their subsequent movements were checked by Geiger counters. These tests proved that the catalyst circulated through all parts of the Houdriflow unit with excellent uniformity.

Houdriflow units are now operating at the highest conversion levels ever achieved in the industry. An informative new brochure describing the Houdriflow process is available on request. Write to: Houdry Process Corporation, 1528 Walnut Street, Philadelphia 2, Pa.

HOUDRY

PROCESS CORPORATION

Pioneer in Catalytic Processes

Horses, freight cars and railroad speeders are used by crews of Canadian Bechtel in surveying route for the Westcoast transmission gas line. (Canadian Bechtel Ltd. photo.)

Pacific Northwest

(Continued from page 73)

which the U.S. commission turned down in the middle of 1954. The major difference is that now Westcoast proposes a 30-inch line instead of 24-inch.

The commission then was considering two applications to serve gas to the U.S. Pacific Northwest, one from Westcoast, and one from Pacific Northwest. The FPC said the basic supply for the area should come from a U.S. source, and thus gave the nod to Pacific Northwest. Later, Westcoast and Pacific Northwest worked out a deal, in which they were joined by El Paso, and made another trip to the FPC. This is what is now awaiting final approval of the Commissioners. Canadian approval has been completed.

Westcoast was incorporated in 1949, as a child of Pacific Petroleums Ltd., one of the first firms to carry on an all-out hunt for oil and gas in British Columbia. Frank M. McMahon is chairman of the board of Pacific Petroleums. Since Pacific began with its first well more than four years ago, it has drilled 100 wells and spent $30 million.

Under the overall arrangement, often called the biggest natural gas deal in history, El Paso Natural Gas Co. obtains a share of the Canadian gas through an exchange. Physically, the Canadian gas stays in the U.S. northwest area for distribution; but 50 million cubic feet daily of it, and possibly more later on, is sold to El Paso Natural Gas Co. for 22 cents per mcf. El Paso gives this to Pacific Northwest, and receives in exchange some of Pacific Northwest's San Juan Basin gas. Some gas in Big Piney field, Wyoming, is also involved. Based in part upon its new supply, El Paso is launching a $196 million expansion of its system to carry gas from Southwestern U.S. to the West Coast. Some 450 million cubic feet daily will be added to El Paso's system for a total of 2.5 billion cubic feet daily.

Paul Kayser, president of the El Paso Natural Gas Co., explained to an FPC hearing before Examiner Glen Law that "we have always regarded, and we still regard a connection into the present reserves and the potential reserves of Canada as being a matter of high importance to the El Paso Co. and we have never given up."

The exchange of Canadian gas for San Juan Basin gas, Kayser said, depends upon continued supply of gas from the Rocky Mountain region; if the supply fails, "a large diameter pipe line will ultimately be built" to carry down the Canadian gas.

All in all, an expenditure of well over one billion dollars is in sight with the approval of the Westcoast plan and related projects. The spending by companies is:

Pacific Northwest Pipe Line Corp.	$188 million
Westcoast Transmission Co. Ltd.	142 "
El Paso Natural Gas Co.	196 "
Colorado Interstate Gas Co.	25 "
Southern California Companies	23 "
Pacific Gas & Electric Co.	20.7 "
Nevada Natural Gas Co.	1 "
Pacific Northwest Distributors	180 "
Pacific Northwest Consumers	180 "
Canadian Distributors	40 "
Canadian Consumers	60 "

While the Pacific Northwest and Colorado Interstate projects are nearing completion, it will be two years before the Westcoast line is completed and ready to carry its first gas to the U.S.

Ray Hamilton, vice president of Bechtel Corp., which will handle the construction, estimated the line would be in service by November 1, 1957. He said the company has 80 miles of the route located and flagged, and that 60 percent has been surveyed. About 50 miles of right of way has been bought, the FPC was told.

Delivery of line pipe is expected in the first and second quarter of next year, most of it from U.S. mills, but some from England. Laying of pipe is expected to start in May or June 1956, with four spreads, one at each end, and two elsewhere, Mr. Hamilton said. About 350 miles of pipe will be in the ground by November 1956. The next year five spreads will be used.

After 1957, there may be need for a new line from Canada, according to many. As Westcoast sees it, "we are preparing plans for a second natural gas pipe line through British Columbia to care for increasing production as exploration is stepped up. Natural gas lines are essential if waste of gas is to be avoided in gas-oil fields which will certainly be discovered.

"The engineering of the second line is now being finalized. It provides for a similar 30-inch line following the same general route at the present project. At the southern end, however, the path branches east with a point of export at the lower end of the Okanagan Valley.

"Westcoast officials, who practically single-handed carried on the battle for a British Columbia natural gas line for the past six years, are sure that the reserves of the north are almost unlimited.

"British Columbia alone has approximately 30 million acres in its northeastern triangle lying in the sedimentary basin. Added to this, however, are many times that area in the Yukon and Northwest territories.

"It is a geological fact that the same sedimentary basin stretches to the Arctic Ocean, and Westcoast feels that the natural outlet for these potential reserves, which might be among the greatest in the world, is down through British Columbia to the Pacific Coast states."

VANCOUVER, B.C.

CONSTRUCTION of a natural gas pipe line to the southern Pacific Coast of British Columbia began October 1. It began with the laying of pipe for the first 20 miles of the 650-mile line. First pipe to be actually laid is in the fertile Fraser Valley section of the province near the B.C.-Washington border.

Westcoast has already received all the Canadian authorizations needed to bring gas from the Peace River district in the northeastern section of the province to the coast and to export the gas to the U.S. The Canadian Company, Westcoast, with headquarters in Calgary, plans to supply gas to communities in British Columbia, but without the lucrative markets of the northwestern United States the $162 million project would not be economically sound.

Survey of the interior sections of the line has been completed and work is expected to start there as soon as weather permits next year. Earlier start on the British Columbia line has been delayed by a series of hearings in Washington and by Canadian commission sittings.

Pending completion of the interior section of the Westcoast line, plans call for an interim purchase of gas from the lines of Pacific Northwest in the U.S. Because of the longer construction season in the south, Pacific Northwest, after it obtains the necessary permits, will be able to supply Westcoast with interim service in July 1956. British Columbia gas will be delivered by the summer of 1957 under present plans.

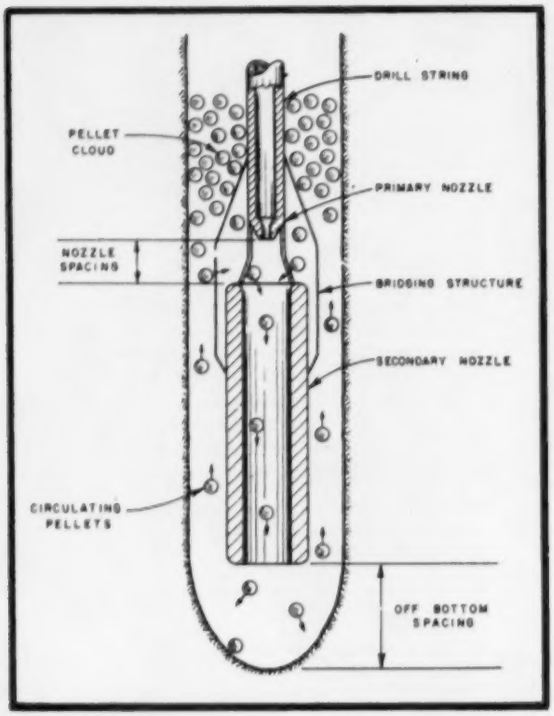
Westcoast officials feel that by starting construction on the southern and more temperate section of their 650-mile line and clearing the right of way and river crossings this winter, they can save one construction season.

Project manager for Westcoast is Canadian Bechtel. Contracts for the Fraser Valley part of the line have been let by Bechtel to Mannix Ltd.

Four cars of 30-inch pipe per day started arriving at Huntingdon in the Fraser Valley on September 28. The heavy-wall pipe, not available from Canadian manufacturers, has arrived from the Consolidated Western Steel Plant at Orange, Texas.

Later Westcoast hopes to obtain large shipments of pipe from the British Commonwealth's only major pipe mill in Durham, England.

(Continued on page 122)



Initial concept of a pellet drill bit.

Two new drilling methods described to industry

PROGRESS on two experimental drilling methods was reported to the industry within the past month. Both involve the application of drilling effort through hydraulic means and are designed to reduce power requirements and create economies.

At the New Orleans meeting of the American Society of Mechanical Engineers, W. R. Postelwaite reported on the research work in turbodrilling which has been conducted for many years by Standard Oil Co. of California. The work has paralleled that done in Soviet Russia (See World Petroleum, March, 1955 page 85 and April, 1955 page 85.)

A few days later at a meeting of the petroleum division of the American Institute of Mining and Metallurgical Engineers in the same city, J. E. Eckel, F. H. Deily and L. W. Ledgerwood, Jr. of Carter Oil Co. reported a new type drilling bit which has been under development at Carter's research laboratories at Tulsa. The Carter method involves the use of small steel spheres which are hydraulically projected against the bottom of the bore hole to break and crush the rock.

Standard of California has found that turbodrilling compares favorably with rotary drilling at shallow depths. There has been some trouble with crooked holes, but it is suggested that this can be cured by interposing a heavy drill collar between the turbine and the bit.

The turbodrill assembly consists of a fluid actuated turbine near the bottom of the hole which is composed of a multi-stage assembly. Rubber sleeve bearings have been developed to improve operation and increase flexibility. Bit speeds on the order of 200 to 250 rpm and drilling fluid flow rate 850 to 1,150 gpm.

Since the drill pipe is not rotated, Mr. Postelwaite indicated that power, pipe and other costs would be very materially lower than with conventional drilling methods.

The new Carter drilling method is illustrated in the accompanying diagram of the first version of the tool. A later design adds bit feet as a means of spacing the secondary nozzle at an optimum distance above bottom. By adding the bit feet it became necessary to rotate the bit.

As indicated in the diagram the steel balls or pellets are introduced into the secondary nozzle by gravity and by aspiration induced by the fluid jet from the primary nozzle above. From the secondary nozzle the pellets are propelled at high speed to the bottom of the hole where they serve to break up the rock by impact. Velocity of pellets as ejected has been at the rate of about 100 feet per second in recent test.

Fluid accompanying the pellets serves to lift cuttings from the formation and the steel pellets. The pellets, however, rise only to a point in the annulus surrounding the primary nozzle where they form a cloud and are recycled. Pellets have been used. It has been found that pellets may be added to the drilling fluid from the surface with removing the bit from the hole.

Benefits suggested by the new method are numerous. Drill pipe wear and trips will be minimized. Drill collars will be eliminated and tool joints simplified. Lighter weight pipe can be used since only moderate rotation is required. These add up to less power equipment on the surface reducing fuel and manpower requirements.

Energy transfer from mud pump on the surface to pellet impact at the bottom of the hole is only about three percent. The remaining 97 percent is dissipated in circulating the fluid and in jetting and recirculating the pellets.

The Carter researchers did not present the method as a development now ready for commercial application. Further work must be done to fully define its potential, although work accomplished thus far does prove that earth formations can be penetrated at appreciable rates.

Photograph by courtesy of Victoria State Railways

BP HAULS THE TRAINS

ON ROADS AND RAILWAYS ALIKE, the power of BP petrol and diesel fuel is helping to move Britain's trade more economically, more efficiently than ever before.

Overseas the story is much the same. Power for trains and for transport by road, air and sea is provided by oil processed in fourteen BP refineries in eight countries. BP products around the world are speeding the pace of progress in commerce, in industry and in the rapidly growing field of private motoring.

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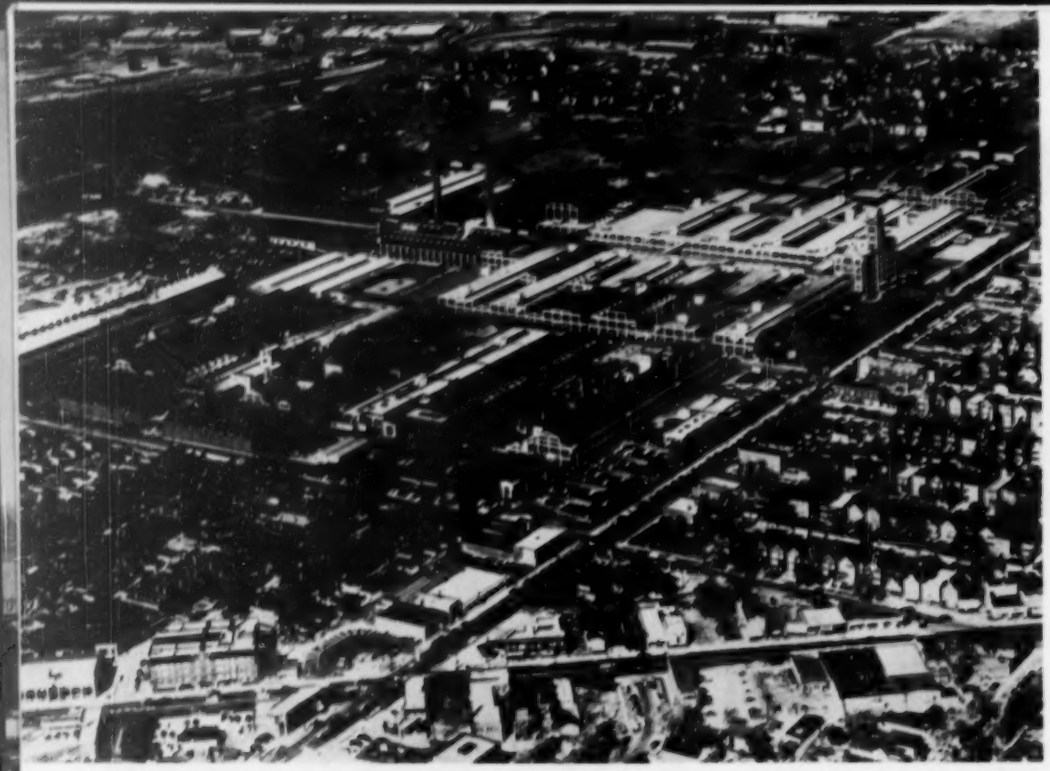
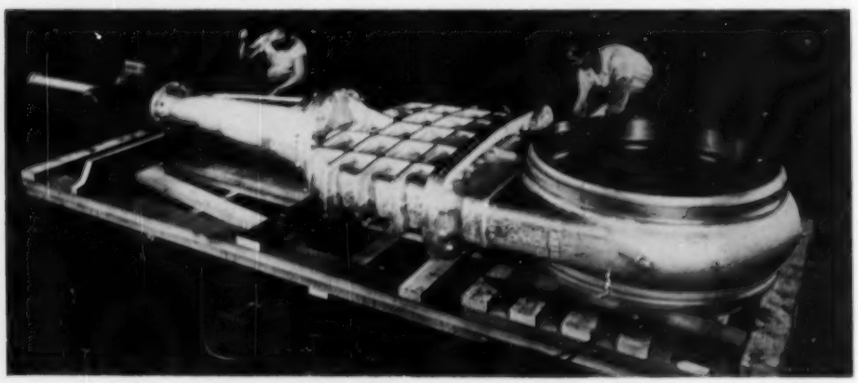


The Crane Company in 1955.

The Crane Company in 1855.

This big 54-inch steel gate valve is one of many products produced by Crane Company. It stands 22 feet high and weighs 14,710 pounds. It is designed for high pressure air equipment.



the history of CRANE COMPANY and ARABIAN OIL

THE Crane Company of Chicago, Illinois celebrated its 100th year in 1955 with a book reviewing the company's operation and a "double anniversary" issue of *Valve World*, its house organ, which discussed progress in the petroleum industry.

The centennial anniversary of this respected company is of particular interest to the petroleum industry, not only for the accessories to the industry which the company produces, but for the unusual part played in the development of Saudi Arabian oil by Charles R. Crane, the eldest son of its founder. Although it is not widely known, Mr. Crane is said to have been instrumental in arousing interest in the potentialities of Saudi Arabia. Following his retirement from the presidency of Crane Company in 1914, he was active in international affairs and in connection with this work became a friend of the former Ibn Saud, King of Arabia. As a favor to the King, Mr. Crane is reported to have financed what was probably the first hard look at Saudi Arabia's prospects by hiring consultant geologists to appraise the country's potential long before oil was discovered there in 1933.

As a token of appreciation for his efforts the King is said to have offered a participation in Arabia's oil, but Mr. Crane refused, saying that he did not wish his reputation as a true friend of the Middle East to be connected in any way with financial interest. He gave the King two complete bathrooms, however, and in return Ibn Saud gave him two Arabian stallions. Thereafter Mr. Crane gave a Stanley Steamer automobile to the King, which was the first car in Saudi Arabia.

Solenoid-operated plunger pump with variable stroke and speed.

Single-stage gas pump with polytetrafluoro-ethylene diaphragm.

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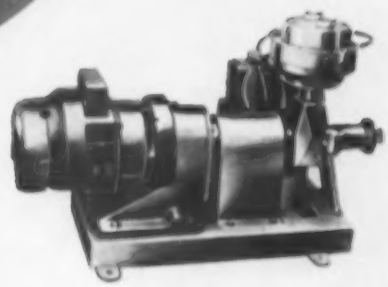
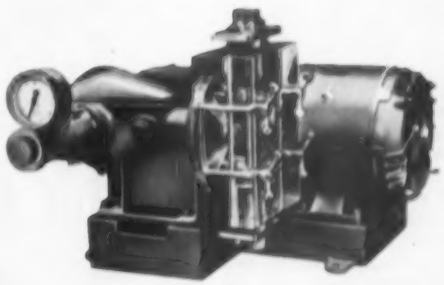
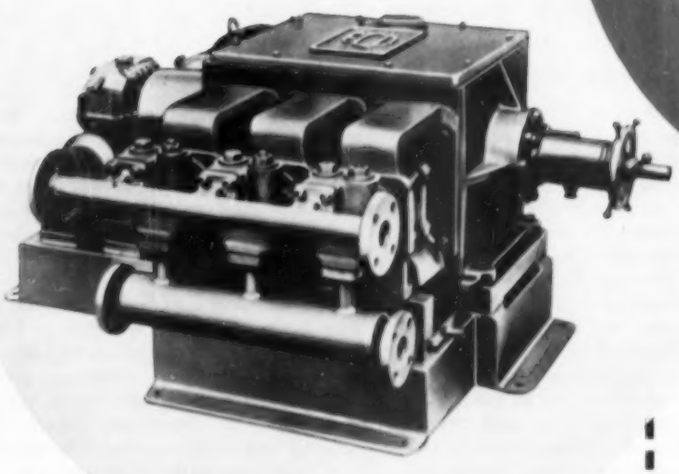




Diaphragm pump micro-capacity control with dial-type stroke adjustment indicator.



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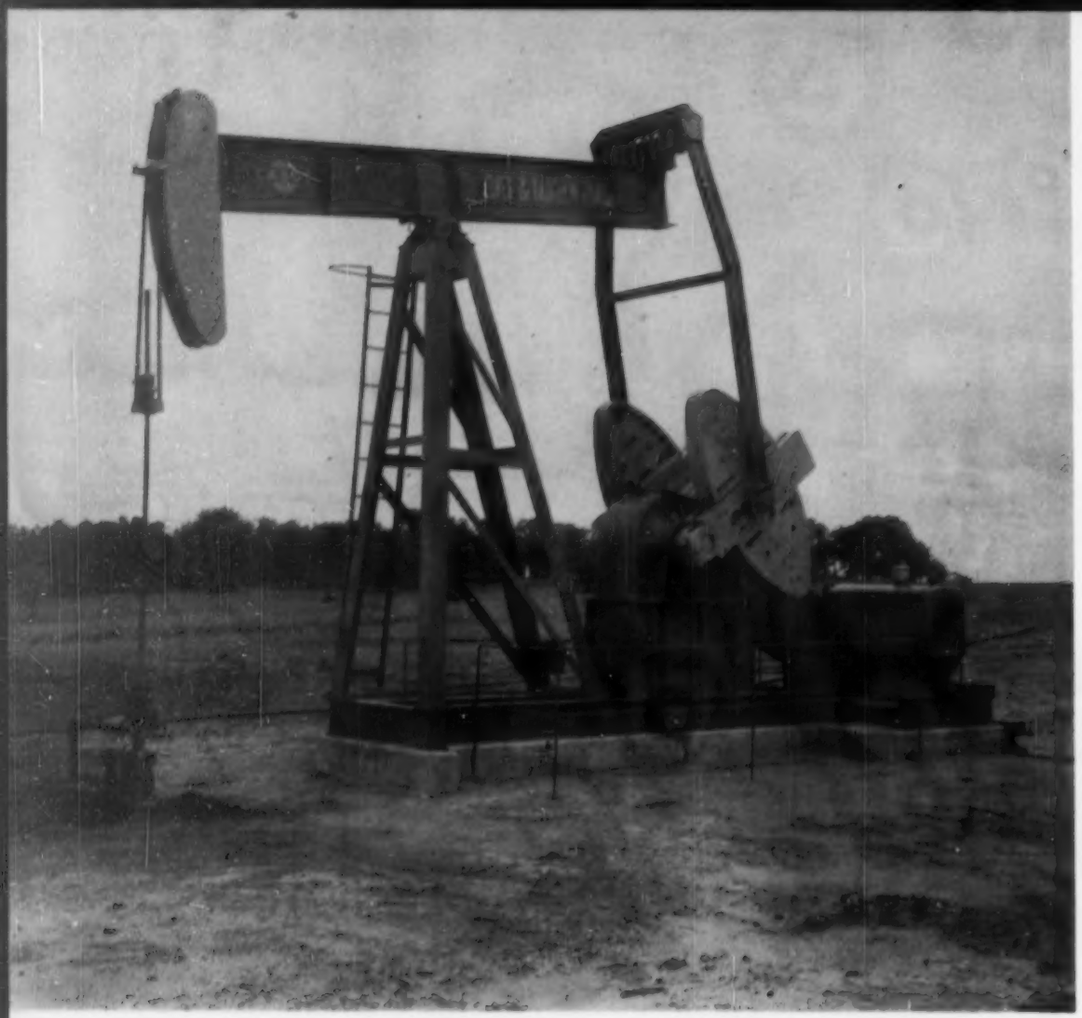


A typical highly engineered modern pumping unit.

W. R. Clarke, chief engineer of the machinery sales department, Jones and Laughlin Steel Corp., joined the predecessor Frick-Reid Supply Co. following his graduation in 1936 from the University of Oklahoma and an engineering degree. His progress in the company was interrupted by World War II during which he was in service for five years. He spent three years in the U. S. Air Force in the South Pacific. Returning to Jones and Laughlin in 1945 as salesman, he was promoted to senior city salesman at Tulsa in 1949, and on January 1, 1952 to assistant chief engineer of machinery sales. After seven months in that post, he stepped up to chief engineer. Mr. Clarke is a past president of The Engineers Club of Tulsa. He also has been a director and treasurer of the club.

W. R. Clarke

As the oil industry reaches deeper into the earth, it is asking the oil equipment manufacturer for more powerful rigs which retain portability, new slush pumps, higher yield-strength tubular goods, pumps capable of lifting oil more than 12,000 feet, and automatic devices to reduce manpower requirements.

THE FUTURE OF PETROLEUM EQUIPMENT

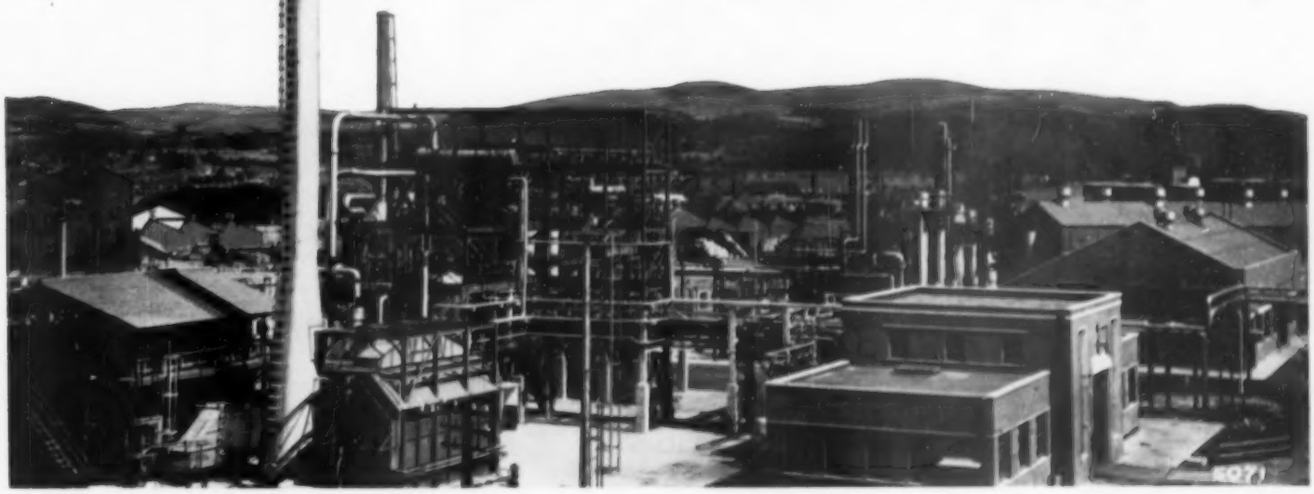
By W. R. Clarke

If Colonel Drake were to return today to inspect our present various and numerous types of drilling rigs, he would be astounded, and yet, basically, he would find many of the same principles he used still very much the same. We still have to drill a well to be sure there is oil even in a "proven" field. Needless to say, our problems today are much more complex due to the greater depths, and the pressures we encounter at those depths. Overcoming many problems as we have gone deeper, we have set important milestones in the drilling industry. In contrast to the small steam engine Drake used as drilling power, there are many rigs today with enough power to light a medium-sized city. Drilling wells 300 times deeper than Drake's well requires huge equipment of above 2,000 hp. Even now we are prevented from going deeper by the lack of certain pieces of equipment. A good example in present equipment is our slush pumps, which have reached their peak individual capacities and will require more development if we are to go deeper. You can rest assured that we are far from through in this respect.

Now let us gaze into the crystal ball. What is ahead is plain. We must go deeper into the unknown: this means higher pressures. To handle these increasingly greater depths and pressures, our future drilling equipment must dwarf our present large rigs. All this equipment must be portable or at least semi-portable so that it will be possible to transport it to the next location. It is now a major transportation problem to move a large rig from one location to

Llandarcy Autofiner, South Wales. Photo by courtesy of The British Petroleum Co., Ltd.

Catalysts for Research and Industry



Commissioned in July 1952, The British Petroleum Co. Autofiner at Llandarcy uses Spence cobalt and molybdenum oxides on alumina catalyst, and has been in continuous operation since that date for the desulphurisation of tractor fuel.

The initial charge of catalyst continues to give entirely satisfactory service. Examination at the end of two years confirmed that the activity and mechanical strength of the catalyst were quite unimpaired.

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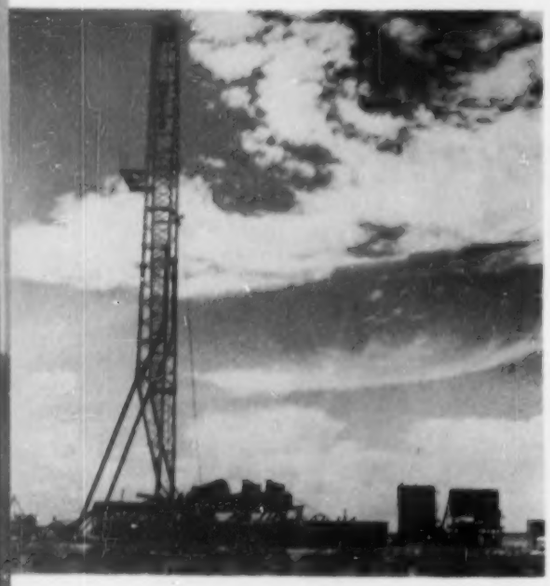

A present day mast built for quick portability and capable of drilling deep tests.

All types of drilling equipment is being beefed up to handle greater weights. Shown is a 400-ton traveling block, one of the largest now available.

another, and this is an obstacle that not only must, but will be overcome by the industry at its usual rapid pace. It is easy to see how transportation problems dictate design factors that will contribute to portability.

The old time pushers are fading from the scene and are being replaced by experienced engineers who specialize in each individual operation or phase of drilling procedure. Much interest is developing in sonic drilling, percussion drilling and air drilling. All these methods are highly technical, and point toward deeper and faster penetration at cheaper cost. Even today, drilling costs are being progressively reduced by better methods which produce more hole at less cost per foot. Competition will continue to reduce total cost and contribute to improved hole quality.

Those who think the oil industry has reached a barrier in equipment development are far from right. Few other industries have had the same continuing challenge to develop. Millions of dollars have already been spent in the design and development of off-shore drilling equipment and the ultimate goals are still far from being reached.

Already we are working with 110,000-pound yield steel in our casing and tubing and the steel industry is being asked for steels with a yield strength of 150,000 pounds—this while we are still drilling just below 20,000 feet. Drill pipe will also have to be made stronger.

Much development in high pressure wellhead equipment has been necessary due to the deeper production already encountered. When it is necessary to use artificial lift methods, the beam type unit has reached its limit. The hydraulic unit is working hard to fill the gap, but it, too, is limited to about 10,000 to 12,000 feet. Whether any of the deeper wells will ever be produced by means of bottom hole pumps remains to be seen. Sucker rods are also limited by their present stress capacities. This cycle of peak capacities revolves around each manufacturer's product and each is striving to be the first to present a new product—better than ever. In the event one does, you may be sure it will be duplicated rapidly, since the principles are generally the same as on present equipment and the originator cannot always protect his improvement by patents. This is a healthy condition which eliminates a monopoly on an individual development.

It has been very interesting to note the development of the triplex type pump for use in waterflooding. One company stood out for years in its production type even though a few other makes were available. Then the flood program really took a forward jump. Now the number of pumps of this type being furnished by various manufacturers is quite numerous, and development is still going strong.

At the last oil exposition in Tulsa, one could immediately see numerous new developments in the making, even though many manufacturers did not want to reveal what they had on the drawing board or on their test floors even by hint, since they desired to be sure their ideas were proven in advance. Untold amounts of dollars go into research and development before most of us know some special device or piece of equipment exists. Yet, on the other hand, there is no better proving ground than its actual use.

The oil industry can foresee nothing but a bright future in developing unknown and undiscovered fields. Only by the rapid swing to the use of high strength alloys the last few years have we been able to go as deep as we have. Today no one knows where the bottom lies. How can the scientists predict our oil reserves will be exhausted in the foreseeable future, as you have undoubtedly heard from time to time? If there is any thought that atomic power will eliminate the need for oil, one has but to look at the tremendous strides that have been made in the petrochemical field. There are only a few big oil companies who have not jumped on the band wagon in this field as a means of diversification from gasoline, fuel oil, etc. Sales in petrochemicals have increased astoundingly. Most of our important chemicals now come from oil. You read almost every day of their new products. But they are not finished. There are still many avenues yet untraveled. Into these plants go high alloy pipe and special equipment which must withstand greater and greater pressures along with much higher temperatures. Corrosion is a major barrier to overcome in these materials. One can visualize vast improvements that will be required to keep in step with petrochemical production.

Manpower continues to be one of our most expensive items of cost. This brings up the new word we are all hearing more and more—Automation! This new development in the oil industry is rapidly being applied to exploration, drilling production, transportation and refining. But as we try to see over the horizon we dream of many more advances on this score.

All operators want more strength but less weight. This means better alloys at costs within reason. One manufacturing company prides itself in stating that it removes the fat and leaves the muscle. This specifically implies that the days of heavy "pig iron" are going if not gone.

It would be all right to predict that "the sky is the limit," but in the case of the oil industry, it would be better to say, "the Earth's core is the finis."

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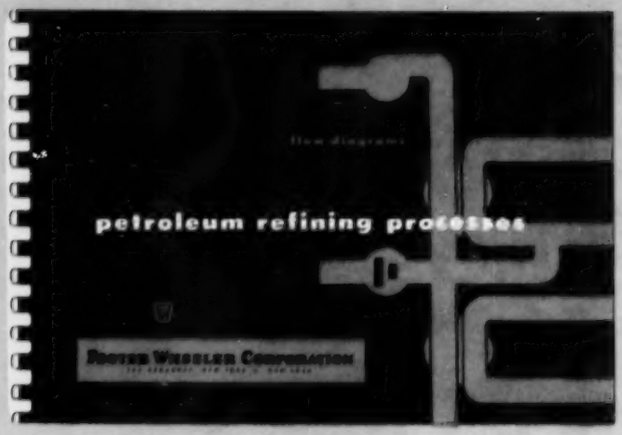

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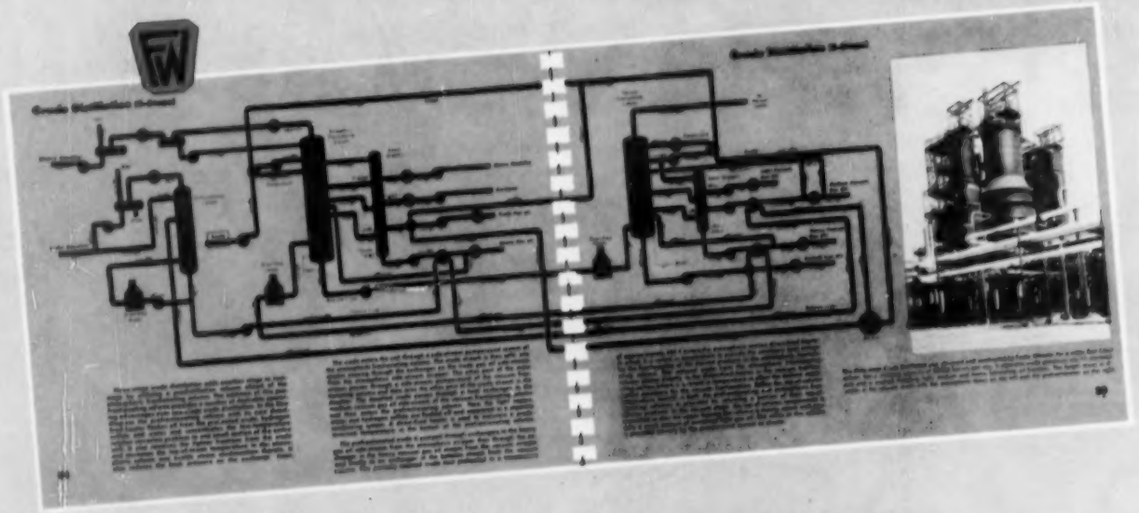

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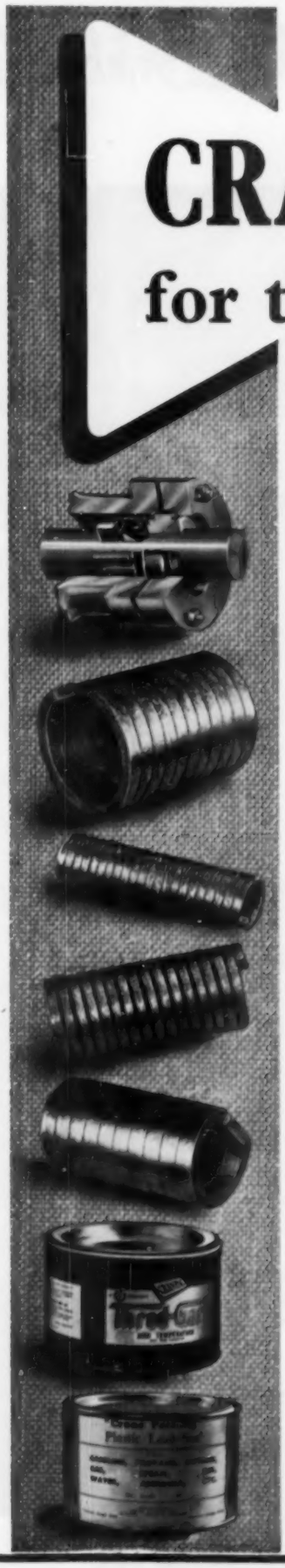

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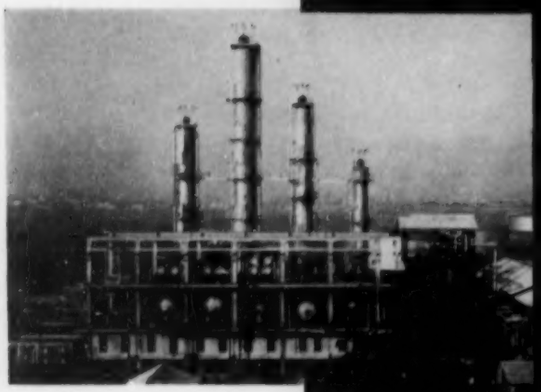

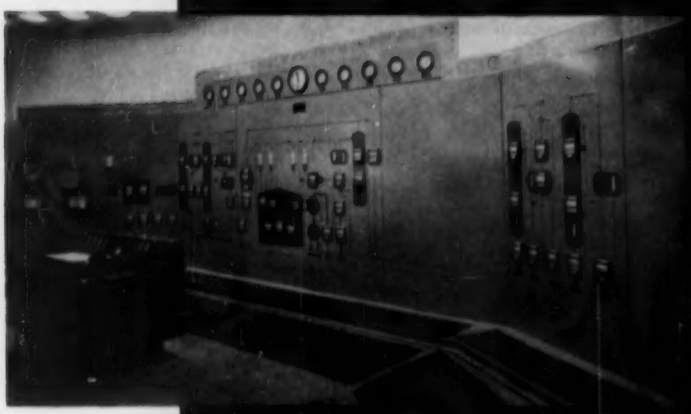

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THE PERPLEXING SECOND BAKU

By Dr. George Rosu

A QUARTER of a century after its discovery, the question of what exactly is the "Second Baku" remains still to be answered. Its fame has been mostly a product of advertising. And like all slogans, this one also has thriven on the customary reluctance to subject a slogan to scrutiny. The result is that the "Second Baku" is still today an undefinable geographical entity. It is commonly known as the sedimentary area which extends westward from the Ural Mountains, but the delimitations are rather flexible.

In Russia itself, the "Second Baku" slogan is rarely used nowadays, and then mostly with confusing intentions, e.g. to announce some startling growth percentages. Soviet utterances specify as main oil regions the Caucasus and the "Eastern Districts." Among the latter are included the Volga-Urals Basin, the Komi-Archangelsk-Novoya Zemlya developments (now christened the "Third Baku"), the Central Asian republics, the Maritime Territory, and Sakhalin which, incidentally, are presently called the "Far East Baku."

It may be recollected that the "Second Baku" name was coined by Stalin 23 years ago for propaganda purposes. This slogan sounded well as a shout of joy at the launching of the second five-year plan. It was intended to assure the public that Russia was far from sinking as a world oil power, for, only a "Second Baku" would be capable of compensating for the premature exhaustion signs of the old Baku, after a decade of the most wasteful exploitation, and thereby save Russia from her worst production crisis.

It was, nevertheless, known for a long time that there were abundant oil accumulations west of the Urals. Surface seeps were mentioned as early as the reign of Peter the Great. However, the first serious exploration started only at the beginning of this century. The first attempt was made by an American oil firm near the village of Shugurovo. Drilling by the Nobel Brothers at Chukhayevo (both points located in the Tatar Republic), gave encouraging results which led to the formation of the Kazan Oilfields Co. Ltd. as a fund-raising set-up in London. The advent of World War I thwarted all further search and development plans.

Soviet attention was again directed toward this area by the outstanding Russian geologist, Dr. Ivan M. Gubkin, who subsequently became a member of the USSR Academy of Sciences. Before his death in April 1939, Dr. Gubkin worked out the main geological formations of the Volga-Urals basin. Oil was first discovered early in 1929 on the Kama structure (at Verkhne-Chussovskiye Gorodky) by accident while sinking a pit hole in a search for potassium. Three years later, and again by accident, oil was discovered at Asian Biobi (Bashkir ASSR). These discoveries led to more serious geological investigation, carried out mainly in Bashkiria and in the Samara gully, with rewarding results.

The greatest exploratory strides in this area were made in 1942 and afterward. The occupation of the Caucasus by German troops prompted the USSR Academy of Sciences to dispatch to the "Second Baku" some 350 outstanding specialists, who surveyed this region during the greater part of 1942. Their knowledgeable application led to the discovery of over 200 anticlines and to oil-producing structures in the Volga-Urals Basin.

Development was delayed practically until 1948 because of an acute shortage of equipment, materials and skills. In addition, these regions are largely inhospitable and in more than one respect mere rural settlements. Tremendous capital was required to permit the creation of a suitable base for oil operations. Until 1949, the rehabilitation of war damages had first priority over the scant Soviet investment funds. It is true that, in July 1930, Stalin had laid the foundations of a new steel center in the Urals at Magnitogorsk as an ample supply source for the growing industry. However, by the time production started in earnest, this center, like the neighboring Sverdlovsk, had to be transformed into armament production.

Retrospectively, it appears that the Soviet government itself was contaminated by the magic of the "Second Baku" slogan, for this area was ordered to equal the output of the old Baku by 1937. This sweeping optimism further drove the government to set a target of 495.5 million barrels for the whole Soviet oil industry for the end of the second five-year plan. This target was subsequently revised and whittled down to 233.9 million barrels, but only 200.5 million barrels was actually produced in 1937. The high hopes for the "Second Baku" proved thus to be at least premature. Its production reached a meager 10.9 million barrels in 1938, and then rose slowly to 13.8 million barrels in 1940 and to 26.2 million barrels in 1945, although the official targets were always set much higher (the 1942 target, for example, was 50.9 million barrels.)

From 1949 on, the boasting about high targets subsided and, instead, more serious development work started in this area. The result is a rather spectacular increase in oil output. According to official expectations, out of a total of 508.6 million barrels in 1955, not less than 60 percent should come from the "Eastern Districts." Inasmuch as the production of the other four districts is still modest, the conclusion is that the Volga-Urals Basin is slated to contribute some 80 percent of the whole Eastern Districts' share. This would amount to approximately 240 million barrels, or 47 percent of the total Russian output expected in 1955. If the plan is accurately fulfilled, this production level will give the Volga-Urals Basin a substantial edge over the old Baku.

The following comparison shows the relative growth of the Volga-Urals Basin (conversion factor: 1 metric ton=7,266 barrels):

	USSR	VOLGA-URALS BASIN	
YEAR	MILLION BARRELS	MILLION BARRELS	PERCENT
1940	226.5	13.8	6.1
1945	140.0	26.2	18.7
1946	157.9	40.7	25.8
1947	186.7	50.9	27.3
1950	275.4	75.6	27.4
1952	341.5	138.0	40.4
1955(Plan)	508.6	239.8	47.1

As the target set for this area by the 17th Party Congress (1934) has been already fulfilled (although after a delay of 18 years), the question arises whether the time has not come also to exclude from the vocabulary the confusing concept of "Second Baku" and speak henceforth only about precise producing regions. The perpetuation of this slogan may greatly increase the confusion caused by the Soviet official percentages and, besides, by the numerous Baku offsprings. During the last decade, isolated developments of the Middle Volga area have expanded. It would serve no purpose to keep them all in the same category.

The object of this paper will be confined to the area included in the triangle embraced by Verkhne-Chussovskiye in the north, Ishimbayevo in the east, and Saratov in the west. This area should properly be called the Volga-Urals Basin.

How can the value of the oil-bearing

formations of the Volga-Urals Basin be assessed?

Starting with the negative aspects, the first disadvantage lies in the wide territorial distribution of the oil deposits. In depth, four oil horizons is the most that can be expected, and not all four are of equal value. Oil accumulation here is not deep as in the old Baku, where up to 23 oil horizons have been counted so far.

The second obstacle is the hard rocks that lie beneath the surface sediments and create serious drilling problems.

Third is the irregularity of the strata. The oil accumulations in the Volga-Urals Basin are as different as is its geological history. The general impression conveyed by this basin is that of a smooth tectonic picture of regularly superposed layers. Oil search, however, reveals a complicated system of faults and foldings, the culmination of which is found in the Volga bend at Samara. This, plus the variegated geological history of the Carboniferous Devonian and Permian strata, causes a dissimilar distribution of the oil deposits. As a rule, oil is accumulated in sand agglomerations seriated with conglomerates and argillaceous beds that underlie the rocks of Carboniferous and Devonian age. Commercial deposits are found in the Givet and Famenne levels, the latter frequently with two oil horizons.

The fourth disadvantage is the high sulfur content of the Volga-Urals crude (from one to four percent) and its high proportion of paraffin and tar. This type of heavy and sulfurous crude creates difficult problems both for extraction and processing. In Kuibyshev Province there are many sulfur water sources. On the other hand, in Kuibyshev Province and the Tatar Republic there are numerous asphalt deposits which occur usually in Upper Carboniferous and Jurassic strata. The greatest known asphalt concentration is that at Sadkinsk (Tataria) where the layer shows a thickness of 55 feet. Other asphalt deposits are developed at Shugurovo and in the area northwest of Molotov City.

The highest sulfur content is found in the oil accumulations of the Carboniferous and Permian strata; Devonian crude has a lower sulfur content. The sulfur concentration of a crude extracted from the same formation may vary according to the lithology of the deposit. Oil from limestones and clay contains more sulfur and less asphalt and tar, while oil from sandstones has opposite characteristics.

Over a third of Russia's industrial reserves are presently located in the Volga-Urals Basin. The deepest oil well on record here is 6,800 feet. There are, however, well-founded hopes that deeper wells may strike oil in the lower strata. Soviet geologists are convinced that below the Devonian strata (9,000 feet and lower) there is a great reservoir waiting to be tapped.

The difficulty is to extract oil from vast reserves which are located in an industrially backward region. In addition to the specific drilling problems there are also specific obstacles area-wise. Complaints about shortages of equipment and materials, transportation, electric power, inadequate housing, etc. come into the open quite often. Often the blame is put on the workers who, allegedly, permit the idling of the equipment for a certain number of minutes every day. And the official solution is the recurrent, monotonous, but comfortable phrase—"The Party organizations must straighten things out and reinforce labor discipline."

The shortage of equipment soon may be relieved to some extent as the government has recently ordered the Magnitogorsk and Sverdlovsk metallurgical centers to manufacture more oil equipment. An additional metallurgical combine was started in 1949 at an undisclosed place in the Urals. Production and repair of turbine drilling has been recently concentrated in the plants of the Gorky steel center.

The Volga-Urals basin has lacked a unified command in both administration and planning. From 1943 until 1948 it was under the guidance of the Commissariat for Eastern Territories. Between 1949 and 1953, this area was centrally directed by the USSR Petroleum Ministry. During the last two years, its main problems have been divided between the Central Oil Ministry and the Azerbaijan Petroleum Ministry, established in 1953. The directives issued last July by the Party's Central Committee leave no doubt that a strengthening of the local planning and operating organizations is afoot. Research and geological survey activities are presently concentrated at the USSR Academy of Sciences, which directs them according to a central plan of priorities.

The administration of the Volga-Urals Basin is entrusted to five Oil Unions (Obyedineniye) plus one Oil Trust located in the territories of the following administrative units: Tatar ASSR, Bashkir ASSR, and the provinces of Kuibyshev, Molotov, Chkalov and Saratov. This enumeration indicates also the importance of the oil sources of this basin.

Tatar ASSR: The present production rate of the Tatar Republic has surpassed that of Bashkiria, and is now leading in the Volga-Urals Basin. The area of the republic itself is 18,000 square miles, and its territory is traversed by the Volga and its tributaries, Vyatka and Belaya. The port of Kazan is being enlarged and linked to the main water arteries of the country.

First commercial deposits were discovered here as late as 1940, but actual development started five years later. The initial utter lack of local skills was hastily filled in with complete teams and brigades of workers and engineers dispatched from Baku, Grozny, Bashkiria, Molotov and Krasnodar. The effort to develop this oil region is tremendous. Investment funds earmarked for the oil industry alone for the 1951-1955 period were almost double the funds allocated for all other branches of economic and social activities. Shortages and deficiencies are, none the less, obvious in many fields, particularly in that of dwelling space and social amenities.

The Tatar oil industry is directed by the Tatneft Oil Union with its seat in Kazan. Situated here also are a Petroleum Institute and an Engineering Institute. The oil developments are all concentrated in the southeastern corner of the republic, on structures similar to those at Tuimazy. The main oil fields are at Shugurovo, Chukhayevo, Yumaguzin, Klimozinskye and Almotysh, all working under the supervision of the Bavlyneft Trust. Drilling work is done by the Tatar Well-Drilling Trust, mostly by means of drilling turbines.[1] Drillers here have five times won the highest award conferred in Soviet "socialist competitions," namely the Challenge Red Banner of the USSR Council of Ministers. The top mechanical speed reached by the champion brigade in individual drilling was 5,168 feet per drilling turbine per month. However, because of frequent mechanical breakdowns, quick dulling of the bit, redrillings and low mechanization, the average commercial drilling speed does not surpass 2,100 feet per turbine month.

Additional speed has been gained by the Tatneft oil workers through transferring derricks from one place to another on caterpillar platforms. This method was inaugurated here, in 1952, for the first time in the Soviet oil industry, but its application is still confined to the Tatar oilfields.

The crowding brigades of workers made it necessary to build two new oil towns (one of which is at Almotysh) and ten workers' settlements. For the 1951-1955 period, a total of half a million square yards of dwelling space was planned, but building is admittedly lagging far behind the housing demand.

According to official claims, the oil output of the Tatar ASSR may rise this year to 17 times the 1950 level. In 1954, it rose 67 percent over 1953, and this year is expected to rise by another 60 percent. In the not too distant future, the Tatar oilfields alone may yield as much as the current production of the old Baku (approximately 130 million barrels). It is now Russia's second oil producing center and, like Baku, is concentrated in a small area (between the Belaya and Volga Rivers, Chistopol and Tuimazy).

This exceptionally rapid increase is due equally to the use of an exceedingly large manpower pool and the higher drilling speeds of the drilling turbine as well as the application of secondary recovery methods. Water pressure was applied for the first time in Russia in the Tatar fields. It is claimed that in the Yumaguzin field alone, secondary recovery is responsible for an output of 72 million barrels of oil during the current planning period. Experiments proved that two cubic meters of injected water yields one ton of oil.

It is further claimed that the flooding method was responsible for half of the total output of the Tatar oilfields in 1954. The cost per barrel of Tatar crude is now only one third of the planned production cost

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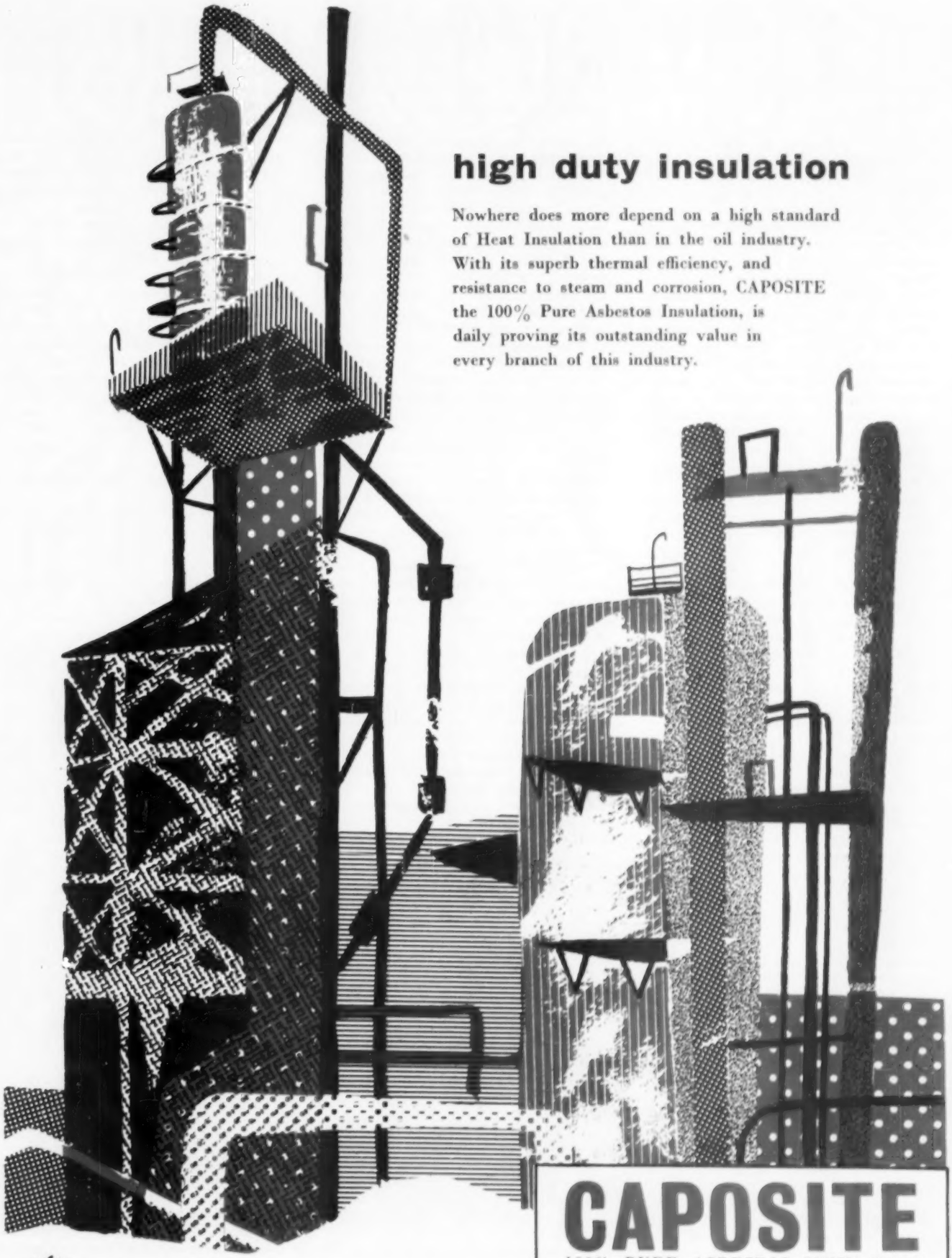
[1]For a complete description of this equipment, see WORLD PETROLEUM, March and April, 1955. G. G. Rosu, *Turbine Drilling and its Application in the USSR.*



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for the entire Soviet oil industry and has, thereby, become the cheapest crude in Soviet Russia.

Extension of the flooding recovery method to other fields in Tatar and Bashkir States is held back by the lack of water and electric power. A few years ago, the Gidrospetsneft Institute carried out hydrological surveys, and worked out a scheme for water supply for both republics. It consists of building a system of reservoirs, and of constructing a special water duct from the Kama and Ik Rivers to the operating fields, together with a series of pumping stations and other works. However, *Pravda*, only last September 9, complained bitterly that the hydrological survey was badly carried out. This has caused delays in the construction by Tsentrospetsstroy of the Tulutusky water barrier installations which, in turn, retards pumping water into the Tatar and Bashkir oil strata. Until this work is completed, almost half of the wells earmarked for flooding cannot be switched to this cheaper operating method.

Bashkir ASSR: Bashkiria is the oldest producing area in the Volga-Urals Basin. The Ishimbayevo and Burankino fields started yielding a sulfurous crude as early as 1933. Four years later, the Tuimazy field was discovered. These deposits have been developed and their production raised only since the end of the last war. Their development is largely due to the help given by the Baku and Grozny engineers, geologists and drillers. The derricks occupy a wide belt from the slopes of Narysh-tau to Tuimazy.

Administration is entrusted to the Bashneft Oil Union which, in turn, works through the Ishimbayneft and Tuimazaneft Trusts. Tuimazaneft operations are centered on the Tuimazy, Oktyabrsky, Chernikovsk and Leonidovsk oil fields. Ishimbayneft directs activities in the following fields: Ishimbayevo, Allaguvatovo, Kusminovka, Kusyankul, Sarakayevo, Burankino and Termenyelga. Drilling is carried out mostly by the Tuimazaburnefti, a special outfit in charge of turbine-drilling. Well depths vary here from 4,350 to 5,900 feet. Individual brigades working in competition claim that they have succeeded in completing wells within 20 days, working around the clock.

Bashkir oil production was quadrupled from 1940 to 1950 and, last year, the 1950 output level was doubled again. On the whole, 1954 production was claimed to be nine times higher than that of 1940. There are presently 25 oil deposits known in the Devonian. Until recently, Tuimazy was the second richest field, after Syzran, in the Volga-Urals Basin, and until four years ago, the Bashkirian fields yielded almost 75 percent of the basin's output. Their fame has now been eclipsed by the Tatar ASSR.

The great influx of workers has caused a quick development of settlements such as Oktyabrsky city. Within ten years, the little village of Naryshevo on the banks of the Ik river has become a city of 100,000 inhabitants. Other growing oil towns are Chernikovsk and Salavat.

The initial lack of skilled drillers and cadres has been filled by the flock of graduates of the Republic's 52 technical high schools. In the capital of Ufa there is a Petroleum Institute and the Bashkir branch of the USSR Academy of Sciences, whose research activities in the chemistry of oil and in geology are to be expanded.

Like Tataria, Bashkiria also is bedevilled by an acute shortage of housing in Oktyabrsky, Ishimbayevo, Chernikovsk and Ufa. The shortage of materials also is fettering progress, and labor discipline is not faultless either. Last year, for example, Petroleum Minister Baybakov complained that building a derrick takes 30 days in Bashkiria as compared with only seven to eight days in Baku. In 1949, the Bashkirian oil workers signed a "competition contract" with their professional brethren in Azerbaijan, but the contemplated results are not materializing.

Also like Tataria, Bashkiria is retarded by the lack of industrial water, insufficient transportation means and limited processing capacity. The Ufa oil-carrying railroad is still not reconstructed, but plans are afoot to lay interfield and inter-factory rail lines.

Unlike Tataria, Bashkiria has an excess of power generating capacity, but the shortage of transmission lines and the absence of a well-organized power grid limits the use of this excess power.

Bashkiria's sorest point seems to be the extreme shortage of refinery capacity. A first round of expansion was completed in 1953, but construction evidently is not in step with crude output. Cracking capacity is extremely inadequate. The paraffin is not extracted, but simply destroyed. Hydrogen sulfide in the field is said to cause terrible headaches among the drillers.

Kuibyshev Province: The Syzran deposits in the Samara gorge have been known since 1935, but it was not until 1944 that the substantial oil sources at Yablonoi were discovered and developed. A year later, the addition of the rich horizon in the Devonian at Stavropol to previous discoveries pushed Kuibyshev into the limelight. Today this province ranks third among the producing areas of the Volga-Urals Basin.

The main oilfields are concentrated around the bend of the Volga, the characteristics and potentialities of which have been reviewed earlier. Under the crystalline rocks of the Middle Devonian lie hard sandstones up to 1,300 feet thick which form the accumulation stratum of the Syzran and Stravropol formations. In the Vereiysk layers, four oil horizons have been traced. Only the upper two are of commercial value.

In the order of their importance, this province's oilfields are: Syzran, Stavropol, Teplovka, Yablonovo, Elshanka and further east, Muchanovo and Kinel. The Muchanovo deposit lies at shallow depth (1,300 to 1,700 feet), whereas in those located in the Volga bend, oil comes from an average depth of 5,200 feet.

The oil industry is administrated by the Kuibyshevneft Oil Union to which are attached four "trests:" Syzranneft, Stavropolneft, Kinelneft (with the seat at Pokvistnyevo) and the more recent Pervomaineft.

At Stavropol, directional drilling has been practised since 1950 to extract oil from beneath the Volga's bed. The two western trusts also have used double-shaft drilling from one location. Pervomaineft claimed recently that several teams are experimenting with a method of exploiting two oil horizons with one well.

The recent impetus in the Kuibyshev oil industry is due also to the fact that since 1950 the city of Kuibyshev has become a huge construction site. Here, on an artificial lake created from the Volga's waters, the government is building Russia's biggest hydroelectric power plant, with an ultimate generating capacity of 2.1 million kilowatts. Although the generated energy will be transmitted to the vicinity of Moscow (probably to a nuclear center), sufficient quantities will be made available to local industry to cure the present chronic shortage.

Due to these construction projects, Kuibyshev now seems to be well supplied with engineers and technical personnel. The city harbors several technical colleges. Once the prevailing shortage of equipment is remedied, conditions may be created for a larger development of the considerable strata lying in the Volga bend region.

Molotov Province: Fourth in importance, in terms of production and reserves, among the administrative units of the Volga-Urals Basin, is Molotov province. Industrially, however, this oil area is least developed. The big hydroelectric power plant presently being built on the Kama may help to remedy this industrial retardation.

Of importance here is the Ufa plateau, located between the Urals and the Kama river. The more promising structures of Pechora and, particularly, Timan (with their fields Ukhtinsk, Izhma, Ust Kulom and Elmatch Parma) are located in the Komi territory. The only extension of the Timan structure into this province is the oilfield at Cherdyn.

Oil has been extracted since 1929 from the upper Paleozoic at Verkhne-Chussovskiye-Gorodky. Richer and more promising sources are, however, those at Krasnokamsk and Severokamsk on the Kama River, where oil comes from the lower Middle Carboniferous and Devonian. Further west, beyond Kama, a number of anticlines have been surveyed, without too promising prospects. The Paleozoic layers of the Kama Wall, where some drilling activity is being carried on, are viewed with greater optimism.

Oil activities in these fields are directed by the Molotovneft Oil Union. From the scanty information available, it may be inferred that the government is still paying little attention to those sources that promise less spectacular rewards. They will be kept in the back row as long as the Tuimazy-Tatar-Syzran fields continue to yield low cost oil.

(Continued on page 149)

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17	148	230	337	466	596												
18	157	244	357	484	630	800											
19	166	257	377	510	665	845	1030										
20	175	271	397	538	700	889	1085	1320	1580	1850	2140	2480	2800	3170			
21	184	286	417	564	735	934	1140	1390	1660	1940	2240	2580	2940	3320			
22	193	300	437	591	770	978	1195	1455	1740	2030	2350	2700	3080	3480			
23	201	312	457	617	805	1020	1250	1520	1820	2120	2460	2830	3220	3640			
24	210	327	476	644	840	1068	1305	1590	1900	2220	2560	2950	3360	3800			
25	218	340	496	672	875	1110	1360	1655	1980	2310	2670	3075	3500	3980	4420	4920	5450
26		354	516	697	910	1150	1420	1720	2060	2410	2770	3200	3640	4110	4600	5120	5670
27		367	536	724	945	1195	1470	1785	2140	2500	2880	3320	3780	4260	4780	5320	5890
28		381	556	751	980	1240	1525	1850	2220	2590	2990	3440	3920	4430	4955	5520	6110
29		395	576	778	1015	1285	1580	1920	2290	2680	3090	3570	4060	4580	5140	5710	6330
30		409	596	804	1050	1330	1635	1985	2375	2780	3200	3690	4200	4750	5300	5910	6540
31			616	831	1085	1375	1690	2050	2450	2870	3310	3820	4340	4900	5480	6110	6760
32			635	858	1120	1415	1745	2120	2530	2950	3410	3940	4480	5060	5660	6310	6980
33			655	885	1155	1460	1800	2190	2610	3050	3520	4060	4620	5220	5840	6500	7200
34			675	912	1190	1505	1855	2250	2690	3140	3630	4185	4760	5380	6020	6700	7420
35			695	940	1225	1550	1910	2315	2770	3240	3720	4300	4910	5540	6200	6900	7640
36				968	1260	1595	1980	2380	2850	3330	3840	4430	5050	5690	6360	7100	7860
37				991	1295	1640	2020	2450	2930	3420	3940	4560	5190	5850	6550	7290	8070
38				1018	1330	1690	2070	2510	3010	3510	4050	4670	5340	6000	6720	7490	8280
39				1045	1365	1735	2125	2560	3090	3600	4150	4800	5470	6160	6900	7690	8500
40				1072	1400	1770	2180	2645	3170	3700	4260	4930	5610	6320	7170	7890	8730
41						1815	2240	2710	3240	3790	4360	5050	5750	6480	7250	8080	8950
42						1860	2290	2780	3320	3890	4470	5160	5890	6640	7430	8280	9160
43						1905	2345	2840	3400	3980	4570	5290	6020	6800	7600	8480	9380
44						1950	2400	2910	3490	4070	4680	5410	6160	6960	7780	8670	9600
45						1996	2450	2980	3570	4160	4800	5543	6300	7110	7960	8870	9820

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International News and Notes

Plan Additional French Pipe Lines

Four more oil pipe lines are to be laid in France next year, according to information reaching Washington. The lines, the work of the North Atlantic Treaty Organization, include: (1) Marseille-Langres, 520 kilometers of 12-inch, cost $9,142,000; (2) Langres-Belfort, 130 kilometers of 8-inch, $1,428,571; (3) Le Havre-Cambrai, 250 kilometers of 12-inch $4,235,714; and (4) Cambrai-Anvers, 55 kilometers of 10-inch, $714,285.

U.S. Steel companies are invited to bid on supply of the line pipe and delivery is sought in the first half of next year.

Bolivia to Announce Revised Petroleum Regulations

Bolivia will announce new petroleum regulations "within the near future," according to a statement September 26 by Ambassador Victor Andrade of Bolivia in Washington.

The regulations covering leasing and production of petroleum in Bolivia "are in the process of revision in order to make that investment more attractive," he said.

The statement came as Bolivia announced it would cooperate with the U.S. investment guaranty program. Under this program, the U.S. guarantees U.S. firms against loss by expropriation and inability to convert earnings into dollars. Bolivia said she is "creating an atmosphere favorable" to investment. The Ambassador added: "In 1953, Bolivia imported petroleum products amounting to between $8 and $9 million annually. Since that time, discoveries have been made which have made Bolivia's oil deficit a surplus. Oil exports are approximately $6 million annually and this amount will grow steadily. It is no exaggeration to say that, in all probability, one of the great oil fields of the world lies in Bolivia and exploitation of this wealth has only just begun."

Sign Exploration Contracts with Pakistan

N. B. Hunt and C. L. Hunt of Dallas signed two exploration contracts with the government of Pakistan September 13. The areas covered total 20,000 square miles and lie west of Karachi toward the border of Iran, touching the coast of the Arabian Sea and the Indus River valley north of Karachi. The agreements call for $50 million expenditure plus a depletion allowance and include the usual 50-50 limitation on government income from operations.

An unusual feature is the participation of the government of Pakistan in costs of exploration, sharing proportionately in ownership of any gas or oil discovered. The government's participation is 25 percent limited to $10,500,000 total for both agreements. Arrangements have been made for the Hunt organization to purchase the government's 25 percent share of any production obtained at wellhead price. In the event of production, the Hunts will consider erection of a refinery for same. They have also agreed to train Pakistani nationals in all branches of operations and to begin exploration and drilling as soon as possible. Further details will be announced later.

Epichlorhydrin Plant for Holland

A new plant for the manufacture of epichlorhydrin by the hot chlorination of propylene, a Shell Development Co. process, is being built by the Royal Dutch/Shell Group at its Pernis refinery, near Rotterdam. Production from the new plant is expected to commence in September 1956. Epichlorhydrin is one of the key ingredients in the production of "Epikote" resins, and at present is only available from the U.S.A.

Iso-Plus Houdriformer Planned

The first European Iso-Plus Houdriforming unit for production of 100 clear octane gasoline will be built in Ravenna, Italy for SAROM, it was announced by Houdry Process Corp. The unit will couple regular Houdriforming and supplemental thermal reforming in the processing of naphthas from Iraq crude petroleum.

Engineering for the new Houdriformer will be handled by Houdry Process Corp. and the Lummus Co., and construction will be carried out by Breda Electromaconia Locomotive, of Milan, Italy. The thermal reforming section is already in existence at SAROM's 35,000 b/sd Ravenna refinery. The new Iso-Plus Houdriforming installation, with a total capacity of 4,000 b/sd, is scheduled to go on stream in June 1956.

Gas Turbine Generator Sets Sold to Colombia

Empresa Colombiana de Petroleos has purchased two 5,000 kw General Electric gas turbine generator sets, the first in that country. The units will be located at El Centro, where Empresa owns producing oil fields. Heavy recovery boilers will be used with the gas turbines to supply steam for operating an existing 5,000 kw steam turbine generator. Natural gas will be used as fuel.

Honshu Island Production

The Mogami oilfield about 10 kilometers south of Shinjo City in north central Honshu Island, Japan, has produced about 924,211 barrels through the first half of 1955 since its discovery about April 1953. A total of 23 wells are now producing in the field. Initial production from the exploratory well was about 25 b/d from about 2,788 feet. Later production was from the Upper Miocene at 1,968 to 2,460 feet.

Sui Gas Pipe Line Arrives in Karachi

The 350-mile Sui gas pipe line celebrated its arrival in Karachi by burning off a 150 mmcf slug of inert compressor exhaust which was put between the gas from the field and the air already in the line to prevent any explosive mixture. The compressor gases shot a 70-foot flame from the end of the 16-inch line and attracted a large crowd. The line was completed after 168 days' construction on April 16, but heavy rains delayed testing.

Initial supply from the line is about 3 mmcf per day, although ultimate capacity is about 110 mmcf. Two companies, Karachi Gas Distribution Co. and the Indus Gas Distribution Co., will handle distribution, and use by local industries is expected to begin soon.

Magnetometer Survey in Great Britain

An airborne magnetometer survey of 10,000 square miles of the Midlands is now being conducted by the Department of Scientific and Industrial Research, through the Geological Survey of Great Britain. Primary purpose is scientific investigation rather than discovery of mineral resources.

New Fueller for Aviation Service

A new type of mobile aircraft fueller which can dispense either gasoline or kerosene fuels at up to 600 U.S. gallons a minute, with delivery pressures of up to 50 pounds per square inch, has been designed by The British Petroleum Co. Two of these "Cornwall" fuellers are already in use in Switzerland and Denmark, and more are on order for international airports in Belgium, Sweden, Greece, France and Australia.

Transfer Biles to South America

Jimmy G. Biles, a wire line specialist for Otis Pressure Control, Inc., in its Falfurrias, Tex., branch, has been transferred to Maracaibo, Venezuela, with Servicio Tecnico de Pozos "Otis" C.A., South American affiliate company of Otis.

To Build Storage & Distribution Plant

Compania Espanola de Petroleos, S.A. (CEPSA) will install at their Teneriffe Refinery (Canary Islands) a bulk LPGas storage and distribution plant. The station will be equipped with ample storage tanks and all the facilities required for the bulk delivery by water of LPGas.

More Hydrofiners for BP's Refineries

Two hydrofining units, one at Hamburg refinery (Germany) and the other at Kent refinery (England) are to be built by The British Petroleum Co. Ltd. Work on the hydrofiners, which will produce a desulferized gas oil, is expected to start toward the end of this year.

The Hamburg hydrofiner will have a capacity of about 5,250 barrels a day, and that at Kent refinery 8,000 barrels a day. The company's first hydrofiner, which was developed at BP's Sunbury Research Station, has been operating for several months at Kwinana refinery, Western Australia.

New Venezuela Refinery

Plans for construction of a $4 million asphalt refinery at Maracaibo, Venezuela, have been announced by Richmond Exploration Co. The new plant will have a daily capacity of 10,000 barrels. Bulk of the output will be marketed by American Bitumuls & Asphalt Co., another Standard of California subsidiary.

Principal component of the refinery will be a two-stage distillation unit, operating on 10.5 degree Boscan crude oil. Auxiliary structures will include a boiler plant and smaller office, shop and laboratory buildings.

New Wildcat in Israel

An Israeli wildcat some 30 miles south of the Lapidoth discovery will be drilled soon by David C. Bintliff, Houston. The test will be located in the center of a 45,000-acre block licensed to Mr. Bintliff in the Halutsa area 155 miles northwest of Bathsheeba. Strong oil odors and gas shows were encountered in a core hole drilled at the location. A find is anticipated in the same horizon as the Lapidoth discovery, but if no oil is found, the wildcat will be taken down to 9,000 feet to test other prospective sands. Gravity meter and geology work have been carried on for more than a year by the operator to determine the most favorable location in the block for drilling the initial test.

Nigeria's Eleventh Well

The eleventh well to be drilled in Nigeria by the Shell-D'Arcy Petroleum Development Co. of Nigeria Ltd. has been spudded in at Umuna, in Owerri Province. It is expected that the well will be completed in about three months. Exploration in Nigeria is being carried out jointly by The British Petroleum Co. and the Shell Petroleum Co. The development company has drilled a total of nearly 15 miles into Nigerian soil.

Applications Made for Exploration Licenses

Exploring companies in Turkey made formal applications for exploration licenses October 13, 1955. Application of the Turkish petroleum law of 1954 was held up while regulations and amendments to the law were being discussed. Meanwhile the 13 companies interested in Turkey were operating under non-exclusive reconnaissance permits. The regulations were published September 13, 1955 with provision that license applications could be made 30 days thereafter. It is expected in Turkey that the applications will be overlapping when made and several months will be required to allocate the areas.

"How Tough Can a Pipeline Job Get?"

. . . asks the Oil and Gas Journal, Aug. 29, 1955, page 72

Laying Tennessee Gas Transmission Company's 24-inch pipe line into the metropolitan New York area involves many unusual problems.

One of the most difficult was construction in the populous city of White Plains, N. Y. Pipe was laid under a heavily travelled main parkway. Ditches had to be freed of water by an extensive dewatering system, and the Bronx River caissoned by sheet piling and sand bags.

Under these rugged conditions pipe laying was completed and the highway restored to traffic a little over one week after equipment moved in.

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Contract Loses Chance for Approval

The Argentine-Standard of California contract lost its last chance for approval when the new President, General Leonardi, said on September 23 that "we shall do our best to provide Y.P.F. (the government's petroleum agency) with the means to increase its oil production and extract the oil from underground by ourselves; it will take longer but it is the best way."

A new Secretary of Industry, Dr. Horacio Morixe, has begun consideration of annulment of the contract. Dr. Morixe was formerly director of Y.P.F. from 1937 to 1943. In that position he approved the formation of a mixed company between Y.P.F. and Ultramar (Texas-Socony Mobil) to explore near Comodoro Rivadavia in the south of Argentina, the original Argentine discovery area.

New Oil Find in France

The first underwater drilling in Europe has been carried out in the Bicarosse Lake southwest of Bordeaux. The work has been carried out by Esso Standard and the formation in which oil was struck is considered to be an underwater extension of the Parentis field.

Interstate Oil Ltd.

Interstate Oil Ltd. has been advised by Frame Lakes Proprietory Ltd., that it is plugging and abandoning its Darriman No. 1 well in Gippsland at 4,730 feet, having found no indications of oil or gas in the objective horizons. Cores from the well are being examined and the significance of the data obtained from the drilling as regards the geology of Gippsland is being studied.

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French Exploration Program

French and American interests have been granted a permit for an initial five-year exploration program in the Paris Basin, it has been jointly announced by American Overseas Petroleum France SAF (Amofrance), one of the Caltex group of companies, and Societe Nationale des Petroles du Languedoc Mediterraneen (SNPLM).

Two seismic crews, one American and the other French, will immediately move into a 20,000 square kilometer area south of Paris. The exploration permit is renewable for two additional periods not exceeding five years each.

American and French geological teams have been studying the Paris Basin for the past two years and pooling their information. For the new work, the area will be divided into four sections of 5,000 square kilometers each, to be covered by the two seismic crews. The work will be directed by a technical committee representing the two interests.

Royalties From Petroleum for Iraq Government

The Iraq Petroleum Co. Ltd. and its associates have paid to the Iraq Government an estimated sum of 35.7 million dinars (135.7 million) in royalties for their operations during the first half of 1955, and another 18.5 million dinars (£18.5 million) was due for payment for the third quarter's operations on October 10, 1955, i.e. a total of 54.2 million dinars (£54.2) million) for the first nine months of the year. It would appear therefore that the total sum for the year will amount to about 72 million dinars (£72 million).

Colombia Exports for First Half of Year

Colombia exports totaled 75,239,000 Colombian pesos (US$30,095,600 at the official rate of exchange) during the first half of 1955. A total of 1,743,507 metric tons were exported, averaging about 66,787 b/d (using a value of 6.9718 barrels per metric ton). The majority of exports went to the Dutch West Indies which took 49.62 percent, but the United States received 85,269 metric tons or 30.72 percent.

Imports during the first three months totaled 9,887,126 Colombia pesos, about US$3,954,850, of which gasolines were 61.15 percent, with gasoline of under 80 octane rating valued at 4,705,411 pesos.

Union to Drill in Costa Rica

Union Oil Company of Calif., which operates in Costa Rica through a subsidiary, Compania Petrolera de Costa Rica Ltd., will drill one more and probably two more exploratory wells in the southern area of Costa Rica, Joel Lloyd, general manager stated. The company is presently drilling Bris #1 well some 35 kilometers from Puerto Viejo. At the end of September, a depth of almost four thousand feet had been reached.

Mr. Lloyd also confirmed the fact that Union Oil Co. will "definitely" file an application for exploration permits in Guatemala early in November when the new petroleum law in that country becomes effective.

Gasoline Plant for Venezuela

A semi-portable gasoline plant designed to operate without continuous operator attendance has been designed for Mene Grande Oil Co. by Brown & Root, Inc., Houston. The plant has been shipped to Venezuela for field installation.

Tailor-made for specific conditions, the plant will process 10 million cubic feet of 600 psi gas daily to produce 26-lb RVP stabilized gasoline. It is mounted on two 10 by 24-foot skids. Bubble towers, fired heater and cooling tower are to be field erected. The plant contains safety shut-down devices.

Pump Catalog

A new catalog (NO. 5001A), describing the complete Vickers line of oil-hydraulic pumps, controls and accessories for general industrial application, is now available from Vickers, Inc., 1400 Oakman Blvd., Detroit 32, Mich.

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New Engine Design

A completely new design in moderate speed, 4-cycle, heavy duty diesel, dual fuel, and gas engines with ratings up to 1,400 hp has been announced by Worthington Corp. Unique feature of the new W9 line is "Jet-Swirl" turbocharged power. This is a streamlined design for air inlet which brings the air in parallel to the inlet valve stem and gives it a swirl as it enters the cylinder. This new "Jet-Swirl" feature allows ramming larger and more turbulent air charges into the cylinder giving cleaner and more complete combustion.

Diamond Drill Catalog

A new general catalog covering Hoffman "Oriented Diamond" drill bits has been released. The new catalog lists sizes, setting charges, weights, uses, etc. for all standard bits.

Made Cabot Carbon VP

J. Boyd Britton of Needham, Mass., has been elected operations vice president of Godfrey L. Cabot, Inc., carbon black and chemical manufacturer with headquarters at Boston, Mass. William L. Loving of Pampa, Texas, has been elected vice president and manager of the carbon black division.

Graves Offices Moved

B. I. Graves Associates, petroleum consultants, moved their offices from New York City to San Francisco, Calif., Oct. 10, 1955. New quarters are at 315 Montgomery Street, San Francisco.

Mr. Graves is well known in oil circles and has been a director of the American Petroleum Institute and the National Petroleum Council for many years.

Hal J. Jones

Named HTC Chief Engineer

Dr. Hal J. Jones has been appointed chief engineer of Houston Technical Laboratories, petroleum instrumentation subsidiary of Texas Instruments Inc. HTL president, R. W. Olson announced. Dr. Jones formerly was director of geophysical research in the TI research division in Dallas. This position will be taken over by Dr. John A. F. Gerrard, director of geophysical research at HTL.

Dr. Jones has been heading the geophysical research at Texas Instruments for three years. Immediately prior to joining TI, he was research engineer and party chief of the geophysical research group at Stanolind Oil & Gas Corp. and before that was associated with Engineering Research Associates and the Shell Oil Co.

Announce AAPG Candidates

Carey Croneis, Rice Institute, Houston and Theodore A. Link, Downing and Cooke Ltd., Toronto, are announced by G. M. Knebel, president of the American Association of Petroleum Geologists, as candidates for presidency during 1956-57. Other officer nominees revealed in the report of the AAPG nominating committee are: for vice-president, Ben H. Parker, Frontier Refining Co., Denver; and Walter H. Spears, Union Producing Co., Shreveport; for secretary-treasurer, William A. Waldschmidt, consultant, Midland, Texas; and for editor, William C. Krumbein, Northwestern University, Evanston, Illinois.

New Ethyl Director

Dr. Lawrence R. Hafstad, a vice president of General Motors and director of the General Motors Research staff, has been elected a director of Ethyl Corp. A leading atomic energy scientist, he succeeds Charles L. McCuen who retired this year as an Ethyl director, vice president of General Motors and general manager of the Research Laboratories Division.

Dr. Lawrence R. Hafstad

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World Petroleum feature issues 1956

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EXPLORATION NUMBER

MARCH

Exploration for oil and gas will be active in the international field in 1956 on recently obtained concessions in both Latin America and the Eastern Hemisphere. The annual March survey will provide a complete picture of current activities and future plans with a special section on techniques and operations in the growing field of offshore reconnaissance.

CANADIAN NUMBER

MAY

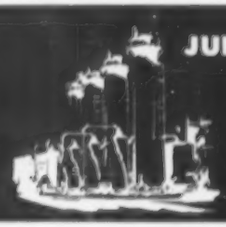
This will be the seventh annual survey of oil, gas and petrochemical progress in Canada. Each yearly number has grown in size, interest and distribution in what has come to be looked upon as the encyclopedia of the Canadian industry's development. The May number will be distributed at the mid-year meeting of the Refining Division of the American Petroleum Institute which meets for the first time in Canada in 1956. News-stand circulation of this issue in Western Canada is substantial.

DRILLING AND COMPLETION NUMBER

JULY 1

The first July issue will be devoted to a study of new drilling equipment and techniques developed to enable the drilling of deeper wells. Special articles will be published dealing with methods of completing oil wells for maximum recovery by primary methods. Secondary recovery developments for stimulating production from oil fields will also be detailed.

ANNUAL REFINERY REVIEW



JULY 15

The 26th Annual Review of refining activity and technical progress will chronicle developments throughout the world with authoritative articles on current problems, improvements in processing, outstanding new construction and a full directory of world refineries with their capacities and products. *Copies of this issue go to every active refinery in the world.*

INTERNATIONAL SURVEY

SEPTEMBER

Each September the editors of WORLD PETROLEUM present a summary of important developments in the international field with facts and statistics on operations in different countries and articles dealing with current problems affecting the industry's worldwide activities—an issue that always attracts exceptional attention. Data is given on world supply and demand and changes in shifting currents of world trade.

A.P.I. NUMBER

NOVEMBER

Keyed to the yearly convention of the American Petroleum Institute and placed before those in attendance at the annual meeting, the November issue presents articles by leading members of the industry discussing problems of direct interest to management and operating men in all departments. It is a number that always receives close attention from men in all branches of the industry.

Canadian Notes

Opens Moose Jaw Refinery

Husky Oil & Refining Ltd. has opened its modernized and expanded Moose Jaw, Sask., refinery according to Lawrence W. Lee, executive vice president and general manager of the company. The Moose Jaw refinery was purchased by Husky late in 1954. The opening marked completion of Husky's $5.5 million program which has boosted the company's total refining capacity from 2,500 b/d in 1947 to 15,500 barrels. Husky also owns two other refineries at Lloydminster, Alberta and Fort William, Ontario.

Additions to the Moose Jaw refinery include a platinum reforming unit, a diesel desulfurization unit, an asphalt vacuum unit and visbreaker.

Imperial Oil to Survey Prince Edward Island

A survey of oil possibilities covering some 500,000 acres of Prince Edward Island will be launched within the next few months by Imperial Oil Ltd., W. A. Roliff, head of the company's eastern Canada exploration operations, said today. Imperial Oil is an affiliate of Standard Oil Co. (N. J.)

This will be Imperial's first exploration venture on Prince Edward Island. Previous efforts by other interests were unsuccessful, including an offshore dry hole in Hillsborough Bay near Charlottetown drilled to 14,686 feet.

To Build Catalytic Reformer

The Fluor Corp. of Canada, Ltd., has been awarded a contract to construct a catalytic reformer for Imperial Oil Ltd., at Sarnia, Ontario. the catalytic reformer is the main unit in a plan calling for expenditure of more than $5 million in improved equipment, as announced by Imperial.

Construction will start early next year and completion is scheduled in the Fall of 1956. The new unit will have a daily capacity of 13,500 barrels of high octane gasoline and will be built from process designs supplied by Imperial engineers.

Appointed Shell Marine Manager

J. B. Archer has been appointed a manager of the marine department of Shell Oil Company of Canada, Ltd., and manager of Shell Canadian Tankers, Ltd. Formerly assistant manager of Shell's marine department, Mr. Archer succeeds K. W. Martin who has been named transportation manager, Shell Oil Co., N. Y.

J. B. Archer

D. M. Morrison

Morrison Heads Trans Mountain

D. M. Morrison, vice president of Shell Oil Co. of Canada in charge of manufacturing has been elected president of Trans Mountain Oil Pipe Line Co. with headquarters at Vancouver. He was elected to succeed J. Grant Spratt who resigned to become managing director of Triad Oil Co.

During the war Mr. Morrison served with the department of munitions and supply in the explosive and chemical division. He was awarded the MBE for his wartime work returning to Shell from his government position. In 1951 he was asked to return to government service and worked for two years as director of the petroleum division with the department of defense production returning to Shell as vice president in charge of manufacturing in 1953.

Saskatchewan Oil History

A complete history of Saskatchewan's petroleum and natural gas industry from the turn of the century to the end of 1954 is now available.

Compiled by the Statistics Division, Petroleum and Natural Gas Branch, Department of Mineral Resources the 204-page yearbook can be purchased at $3 per copy from the department.

The yearbook includes data on exploration, development, production and land activity over the 54-year period, tables, graphs, a 15 by 15-inch map showing petroleum and natural gas production and disposition on areas, and a stratigraphic correlation chart of Saskatchewan.

Dawson Creek Plant Nears Completion

One of this continent's farthest north refinery locations is scheduled to begin production of gasoline at year's end. The 500-barrel-per-day Houdriformer is being built at Dawson Creek for X-L Refineries Ltd. of Edmonton. Construction is being handled by B. D. Bohna and Co. Ltd. of Vancouver and E. V. Lane Corp. of Palo Alto, Calif. under a joint contract.

New Administration Building

Contract for a $300,000 administration and plant protection building at the Canadian Oil Companies, Limited refinery at Sarnia has been let.

Tanner Resigns from Royalite

E. H. Tanner has resigned as a director of Royalite Oil Co. because of the press of other duties. No decision has been reached by Royalite as to a successor. Mr. Tanner is president of Triad Oil Co. Ltd., Calgary.

Opens Calgary Office

R. D. Leisk, president of Sunshine Exploration Ltd. announced the opening of Calgary offices in the Lancaster Building. A. F. Wynn formerly of Amurex Oil Development Co. is general manager of Sunshine Exploration Ltd.

Expanding Manufacturing Facilities

As a result of the financial interest which Toronto Iron Works, Ltd. recently acquired in the British firm of Dominion, Scott, Barron, Ltd., it was announced that Toronto Iron Works would expand its manufacturing facilities and sales organization. The company has long experience in the fabrication of mild steel platework and alloys and Dominion, Scott, Barron supply engineering specialization in the design of plants in the chemical, food and allied industries.

Heads Safety Conference

W. M. V. Ash, president of Shell Oil Co. of Canada has been elected chairman of the Canadian Highway Safety Conference. A program of action to reduce traffic deaths and accidents was approved. Dec. 1 will be national Safe-Driving day.

Carbon Blacks Plant Expansion

Cabot Carbon of Canada, Ltd., Sarnia is expanding plant facilities to increase production of oil furnace carbon blacks from 20 million pounds to 55 million pounds per year. The expansion will be completed by the end of the year. Cabot Carbon of Canada, Ltd. began operating Canada's first carbon black plant in 1953.

Book Review

Bibliographic Survey of Corrosion, 1950-51; Published 1955 by National Association of Corrosion Engineers, Houston 2, Texas; 430 pp., 8½ x 11 inches; $12.50.

This is the fourth of a series of volumes listing all available information on the subject of corrosion of industrial equipment. The author's index includes more than 4,000 names, and references to innumerable sources of corrosion, procedures for corrosion control, and information on the corrosion resistance of materials of construction. References are made to the special corrosion problems of 38 industries. A large section is devoted to corrosion in petroleum refining and production. An extensive system of cross-indexing makes it possible for almost any engineer to locate information that might apply to his special case.

Octane Ratings Higher

Advancing for the sixth successive month, gasoline on sale at U.S. service stations in July reached a nationwide weighted average of 95.8 octane number for premium and of 88.5 octane number for regular, according to the latest monthly survey of gasoline quality compiled by Ethyl Corp. Both grades were 0.2 octane number higher than their corresponding June averages. Compared with July 1954, premium gasoline was 2.1 octane numbers higher and regular gasoline was 1.8 octane numbers higher.

Average tetraethyl lead content in July were 2.57 ml per gallon of premuim gasoline and 2.21 ml per gallon of regular gasoline.

Pacific Northwest

(*Continued from page 93*)

Trans-Canada Pipe Lines Ltd. has placed orders for the purchase of 335 miles of natural gas line pipe at an approximate cost of $9 million for the construction of the Toronto-Montreal section of its project. The 20 and 24-inch pipe is to be delivered to Trans-Canada in the spring of 1956. Permission to build the Toronto-Montreal section of its line to take Alberta natural gas to eastern Canada was granted Trans-Canada Sept. 15 by the Board of Transport Commission in Ottawa. U.S. gas will be imported at least temporarily.

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British Oil News

By E. Lawson Lomax

During this month it has been announced by four British companies that orders have been placed for the construction of 67 new tanker vessels for a total approaching 1½ million dwt. Of these 67 vessels, 40 have been ordered by two of the larger petroleum companies and the other 27 have been ordered by two of the general shipping companies which in the past have not been concerned with this type of shipping.

Sir Donald Anderson, a managing director of the P. & O. (Peninsular & Oriental Steam Navigation Co.) announced on September 12 that the board of directors had decided the tanker business should be a timely and profitable enterprise. It was decided to establish a fleet for this purpose over the next decade and as a preliminary step, orders were placed with British shipyards for the construction at an estimated cost of £37 million, at present prices, of 25 tankers, most of which would be general utility vessels of about 18,000 dwt each, although some may be over 32,000 dwt each.

Of these vessels, seven are for delivery in 1958, nine in 1959 and the remainder in 1960. No limit has been fixed on the size of the fleet and others will be ordered in due course if the success of the initial venture justifies this action. A substantial portion of the cost of the new venture is being raised by the offer to debenture, preferred and deferred stockholders of a new issue of £10 million in five percent debenture stock 1975/80.

Wm. Cory & Son, coal and oil contractors and shipowners who previously have not been directly connected with tanker shipping, announced on September 28 that an order had been placed amounting to about £2.8 million for two 18,000 dwt tankers, one to be built by Sir James Laing & Sons, Sunderland, and the other by Blyth Dry Docks & Shipbuilding Co., Blythe, Northumberland. Delivery dates for these vessels are 1958 and 1959. Inquiries for these vessels were placed both in British and continental yards when British prices were found to be fully competitive with continental prices. It is quite possible that these will not be the only tankers Cory will eventually own, as its interests are closely connected with the oil industry.

Shell Petroleum Co. announced on September 22 a new tanker building program following its program for the building of 70 ships announced in April 1951. Thirty-four new vessels have been ordered, and more may be ordered in the near future. These ships will consist of equal numbers of standard general utility tankers of 18,000 dwt and of the super tanker class of about 32,000 dwt. Twenty of the vessels will be built in nine yards in Great Britain, the remaining 14 in five yards in Holland. Deliveries will begin in 1958 and are expected to be finished in 1960.

Esso Petroleum Co. Ltd. also announces that it has placed orders for six new 36,000 dwt tankers. The order for two of these vessels has been placed with Vickers-Armstrong for delivery in 1958, the orders for the other four having been placed with German shipyards.

The main reason for the placing of these new orders is the fact that oil is taking a much larger part in British energy consumption, having risen from about six percent pre-war to a present-day figure of about 15 percent, and this increased percentage on a larger gross consumption, which greatly increases the demand for transport of this commodity, has caused an increase of well over 100 percent in world tanker tonnage between 1938 and 1954.

The decision of P. & O. and Wm. Cory & Son to enter the tanker shipping world will be welcomed by the oil industry in general, if only for the easement it gives to capital requirements. A short time ago the managing director of Shell-Mex & BP Ltd. estimated that the oil industry would have to meet an annual capital expenditure of some £2,000 million over the next 20 years, to cope with the increased demands for petroleum and its products, and that the major portion of this capital would have to be supplied from the industry itself as there are few other sources from which it could come. The advent of capital from the shipping world will therefore ease the burden to some extent.

Long Helicopter Flight

Two Westland Whirlwind helicopters, which are to be used to fly staff and supplies between the shore base at Doha, Qatar, in the Persian Gulf and the off-shore drilling rig which Shell is operating in the coastal waters, have been flown from Eastleigh Airport, Southampton to Doha. This completes the longest flight ever made by British-built helicopters. The route taken was via France, Italy, Greece, Cyprus and Iraq, the longest leg being 250 miles over the sea between Rhodes and Nicosia.

New "Super Tanker," World Glory, owned by World Tankers Co., Inc.

Catalyst Plant on Stream in Holland

The well-known chemical firm of Ketjen of Holland has recently completed the erection at Amsterdam of a second plant for the production of catalysts used in petroleum refining.

Kenjen built the first plant on the continent for the manufacture of MS fluid cracking catalyst, and as a result of their experience in that line were able to go ahead immediately it was required, in preparation for a new MS fluid hydroforming catalyst under license from Standard Oil Development Co. (now Esso Research and Engineering Co.).

Council of British Manufacturers of Petroleum Equipment

The first annual dinner of the C.B.M.P.E. was held at the Dorchester Hotel, London on September 29 under the chairmanship of G. V. Sims of Le Grand, Sutcliffe & Gell, Ltd. Among the guests were His Excellency the Iranian Ambassador, the Charges d' Affaires of Jordan and Venezuela, representatives from the embassies of the United States of America, countries of Western Europe and the Middle East, friends from the Commonwealth, Pakistan and India, members of the government departments and the fighting services, and others representing the world's petroleum industry.

The principal guest and speaker was Lieut.-General Sir John Eldridge, Controller of Munitions, Ministry of Supply. Sir John Eldridge, in his speech, stressed the fact that his department must specialize to a great extent on work which is not done elsewhere, and therefore had to rely on industry to take advantage of the many advances being made in materials, design techniques and production methods.

A list of materials and equipment orders placed in the United Kingdom by the petroleum industry during April-June 1955 showed a total of £30.3 million, of which bulk chemicals, catalysts, barites, etc. were £5 million; specialized drilling and production equipment were £3.1 million; and tubulars, pipe fittings and valves were £4.5 million. Total purchases during 1954 were £80 million, compared with £67 million during 1953.

Tanker News

Swan Hunter announces that the 18,000 dwt tanker "Heldia" built by them to the order of Shell Tankers Ltd., was sucessfully launched at their Wallsend-on-Tyne shipyard on September 2 by Mrs. T. Clifton Webb, wife of Thomas Clifton Webb, High Commissioner for New Zealand in the United Kingdom.

Speaking after the launching, A. S. C. Hulton, managing director of Shell Tankers Ltd., said that this vessel put the tonnage launched at Swan Hunter's for the Shell Group to over 400,000 tons over a period of 52 years, nearly half of which has been delivered since the war. He therefore urged the shipbuilding industry to study its costs carefully and to build up their defenses against possible future danger of loss of orders.

Furness Shipbuilding Co. Ltd. announce that the 24,800 dwt single screw turbine Tanker "Panagria," built by them to the order of Porto Alegre Companhia Naviera S. A. of Panama, was successfully launched at their Haverton Hill Shipyard on September 15. As the vessel left the ways she was named "Panagria" by Mrs. Sophia Pneumaticos. The vessel has a designed speed of 14.25 knots. Length overall is 593 feet. The propelling machinery consists of a set of Richardson Westgarth's latest type of steam turbine developing 7,300 shp at 100 revs with maximum power of 8,200 shp at 104 revs. Steam is supplied by Foster Wheeler "D" type boilers at 450 psi at 750°F.

Hawthorne Leslie (Shipbuilders) Ltd. announce that the 10,000 dwt single screw motor tanker "Athelstane," built by them to the order of Athe. Line Ltd., has sucessfully passed her sea trials and been handed over to her owners.

London and Thames Haven Oil Wharves Ltd. announced on September 1 that the world's largest tanker, "World Glory," owned by World Tankers Co., Inc. (the Niarchos Group), discharged 40,500 tons of Kuwait crude oil at their Thames wharves in 30 hours, this being the largest cargo of oil ever to be handled on the Thames.

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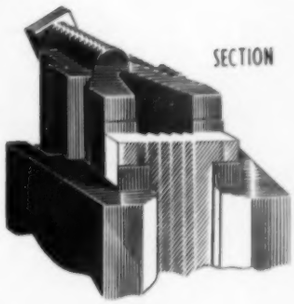

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New Asphalt Carrier

An asphalt road tanker of a novel design has been developed by J. H. Sparshatt & Sons (Southhampton), Ltd. and Leyland Motors Ltd. The asphalt tank is mounted on a Leyland Comet fully forward-controlled tipping truck. The all-welded steel body is of double-skinned insulated construction, with approximately two inches of fiber glass interposed between the skins on the front bulkhead, sides and tail board.

A twin radiator unit is installed between the two floor skins and heated by exhaust from a Leyland diesel engine. A double-skinned canvas blanket with fiber glass insulation covers the full length of the top of the body. This blanket can be removed as necessary for operation purposes and when the tanker is loaded with hot asphalt it is securely attached as insulation.

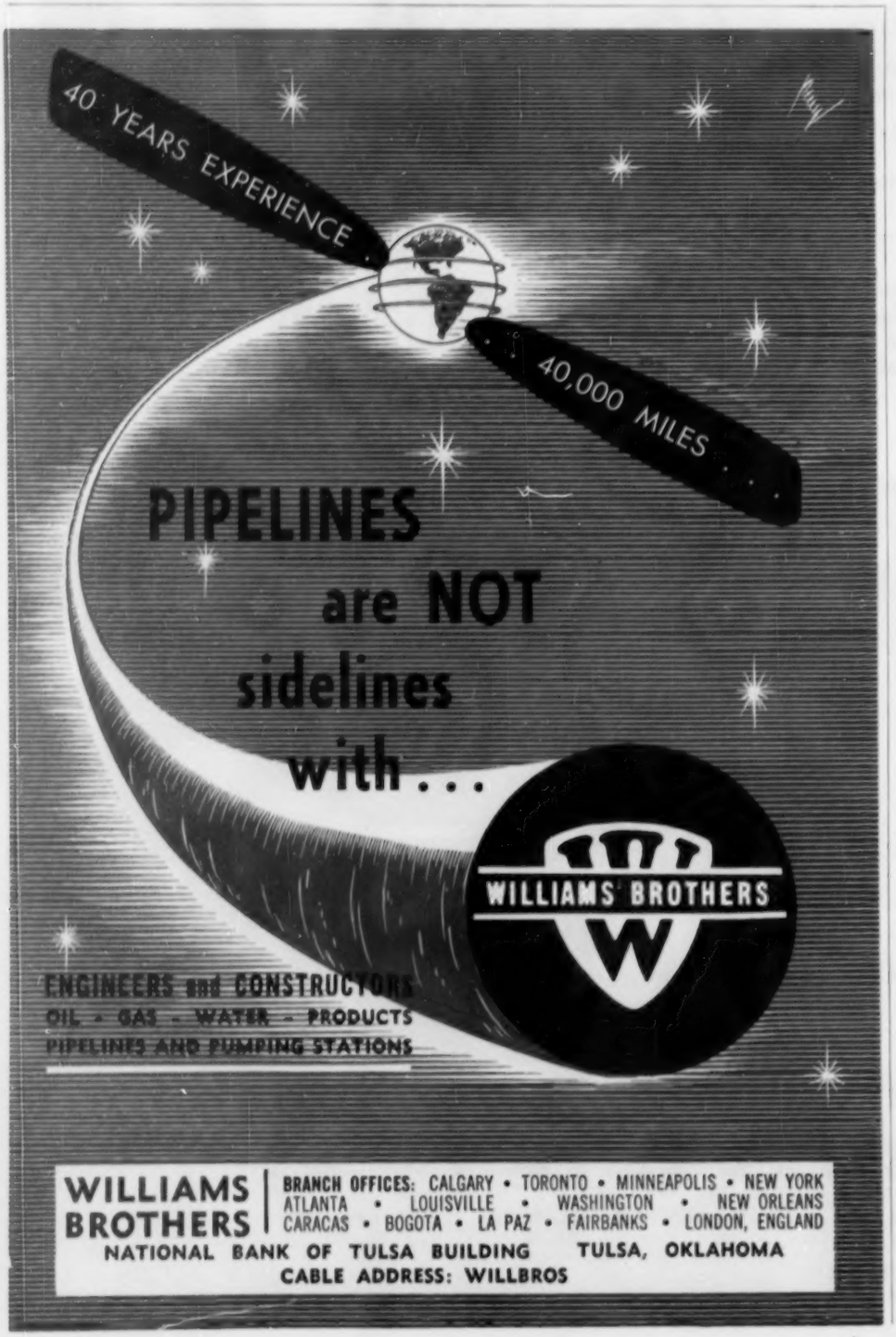
Company News

The board of directors of Petrochemicals Ltd., now a subsidiary of Shell Chemical Co. Ltd., has been reconstituted to include W. F. Mitchell as chairman, L. H. Williams as managing director, F. H. Braybrook as general manager and F. Mackley, E. J. Barnsley and L. R. Batten as members.

The directors of London & Thames Haven Oil Wharves Ltd. announce the declaration of a interim dividend of five percent - five - less 8/6d in pounds income tax on the ordinary share capital in respect of the year ending December 31, 1955 (five percent - five - 1954), payable on November 1, 1955 to shareholders registered in the books of the company on October 3, 1955.

C. C. Wakefield, manufacturers and blenders of lubricating oils, have declared an interim dividend of 7½ percent on the ordinary capital of £2,502,500. In November 1954 a scrip issue of 100 percent was made and the present dividend is equivalent in amount to the interim dividend paid in 1954. A final dividend of 20 percent was made on the present capital in 1954.

Stevenson, Hardy & Co. Ltd., oil importers, distributors, tanker managers and brokers, have added another to their several successful years of operation. Group profit after taxation has risen from £117,027 in 1953-54 to £124,660 in 1954-55 in spite of increased taxation from £100,214 to £150,851. An interim dividend of five percent was paid in March 1955 and a final dividend of 10 percent is proposed for the year ending April 30, 1955.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Increase in Price of Motor Spirit

All the major oil companies operating in the United Kingdom raised the price of their premier grade motor spirits by one penny per gallon during the latter part of September.

According to the explanations given by the companies, this increase becomes necessary to cover increased distribution costs, which include wages, salaries and rail freights, which in the past have been borne by them and not passed on to the public. Another factor is the steadily increasing demand by the public for higher quality grades, for which additional expensive refining plants have had to be installed.

The price of second grade motor spirit has not been raised as the production of this grade does not call for the use of this expensive plant. In fact, apart from increase in tax, this grade costs no more today than it did in 1950.

Deliveries of motor spirit to dealers and commercial consumers for the first six months of 1954 and 1955 rose from 2,811,317 tons to 2,973,342 tons respectively. Premium gasoline rose from 46.4 percent of the 1954 total to 48.9 percent of 1955 deliveries or from 1,305,887 to 1,455,147 tons. Standard gasoline rose only slightly from 1,505,430 to 1,518,195 tons.

Personnel

A. M. Robertson has been appointed general manager of Scottish Oils and Shell-Mex Ltd., to succeed T. W. Lyle, who retired from the company on September 30. Mr. Robertson joined the Anglo-Iranian Oil Company Ltd. (now The British Petroleum Co.) in 1937 and on October 1, 1954 was transferred to Shell-Mex and BP Ltd.

O. H. Fish, former dealer sales manager of Regent Oil Company Ltd., has become general sales manager as of October 1. Mr. Fish has been with Regent since January 1, 1954, originally coming from the California Texas Oil Co., New York.

Dr. A. M. Baxter has been made head of the research department of G. & J. Weir Ltd., Glasgow engineers, effective December 1.

Shell Films

The latest film produced by Shell Films is called *"The Rival World"* and deals with man's fight against insects who are the people of the rival world. Shell Films has recently produced a catalogue of the films it has made and which are available for distribution. It embodies a total of about 137 films covering petroleum, aviation, motor racing, power engineering (theoretical), flight, industrial engineering, agriculture and horticulture, craftsmen, miscellaneous and cinemagazine, each being briefly described. Information is given as to where these films can be borrowed for showing to interested groups in any station of life.

New Hydrofiners for British Petroleum Refineries

The British Petroleum Co. announces that erection of two new hydrofining plants will commence in the near future. One has 400,000 tons per year capacity and will be erected at BP's Kent refinery. The other, of 260,000 tons annual capacity, will be erected at BP's Hamburg refinery. The hydrofining process for the desulfurization of gas oil was developed at the company's research station at Sunbury and the first commercial unit is already in operation at the Kwinana refinery, Western Australia.

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Oil Company Staff Changes

CHARLES LEET, general manager of the East Coast manufacturing activities of the Esso Standard Oil Co., has been elected a director of Creole Petroleum Corp. and will join Creole in Venezuela at the end of the year.

Mr. Leet began his service with the Jersey Standard company as a student engineer in 1930 and shortly thereafter was transferred to Esso's Baton Rouge plant. Later he headed the technical service division of the Esso Standard company and in 1950 became assistant manager of the Baton Rouge plant, in February, 1953 was appointed manager of the Bayonne, N. J. refinery and in November 1953 was named general manager of East Coast manufacturing.

H. R. BOLTON will be elected vice president in charge of exploration and production of Crescent Corp. to succeed C. A. Houy, who has resigned to become president of the Lee Evans Drilling Co. of Tulsa. Mr. Bolton joined the Crescent team in July, 1950, as chief engineer and most recently was manager of production.

JOHN R. SUMAN, former vice president and director of Standard Oil Co. (N.J.) has been elected a director of Schlumberger Well Surveying Corp. Mr. Suman retired last March and opened an office in Houston as a consultant. He was retained by Chemical Corn Exchange Bank and Blyth & Co., Inc. of New York and elected to the advisory committee of the board of directors of the Chemical Corn Exchange Bank.

Mr. Suman has been active in the oil business since 1912 when he began his career as assistant geologist for the Rio Bravo Oil Co. in Houston. He was chief engineer for Rio Bravo from 1913 until 1917. From 1917 to 1919 he was technical superintendent for Texas and Louisiana for Roxana Petroleum Co. In 1919 he returned to Rio Bravo as assistant to the vice president and general manager. He was also assistant manager of the East Coast Oil Co. of Mexico, a subsidiary of Southern Pacific in 1922 and manager in 1923. From 1923 to 1925 he served as general manager of the Texas operations of the Associated Oil Co. of Calif.

Mr. Suman was a director of the Humble Oil & Refining Co., Houston, from 1927 to 1933, at which time he was made vice president in charge of production. In February of 1945 Mr. Suman was elected vice president and director of Standard Oil Company (N.J.) and became a regular member of the executive committee in January, 1946.

DR. NORBERT J. ROBERTS has been appointed associate medical director of Standard Oil Co. (N.J.). Dr. Roberts previously served as a member of the staff of Jersey Standard's medical department from 1949 to 1952. For the last three years, he has been medical director of the Pennsylvania Railroad.

Dr. Norbert J. Roberts

CHARLES J. MELLENDECK has been appointed marine superintendent for Tide Water Associated Oil Company's eastern division. He joined the company in 1931 and served as engineer on the "S. S. Veedol II" and the "M.S. Tidwater." In 1936 he was named assistant to the marine superintendent. Succeeding Mr. Mellendeck as assistant marine superintendent is Walter Kucaba, acting inspector of ship repairs.

A. H. TOMLINSON, a director of Standard-Vacuum Oil Co. since the firm's formation in 1933, retired Oct. 1. For more than 20 years of his 34-year oil industry careeer he was responsible for Stanvac's refining operations all of which are in the Eastern Hemisphere.

During this period, Mr. Tomlinson who was a member of the original 10-man board, saw the company's oil refining capacity expanded from a single 28,000 b/d plant in Indonesia to six refineries located in five different countries with a total crude charging rate of more than 160,000 b/d. Product manufactured from more than 335 million barrels of crude oil were supplied from these refineries to the people of the Asian countries and to Africa, Australia and New Zealand.

Mr. Tomlinson entered the petroleum industry in 1921 when he joined what is now Esso Research and Engineering Co. He became a process superintendent at Esso Standard's Bayway refinery at Linden, N.J., in 1926, and two years later went to South Sumatra as superintendent of the Sungei Gerong refinery near Palembang. Returning to the United States in 1932, he accepted the director's position at Standard-Vacuum's headquarters in New York the following year.

CAPT. ROBERT J. BALL, port captain for Sun Oil Co. has retired after a half a century at sea. He joined Sun with the rating of third mate in 1916 and in 1920 was given his first full command. This was the "S. S. Paraguay," a Great Lakes ore carrier coverted to tankship and the first ship owned by Sun Oil Co. He was made port captain at Marcus Hook, Pa. in 1948.

R. N. DUNCAN will be responsible nationwide for all Shell Oil Co. products supply, crude and volatiles, and transportation and supplies economics activities.

K. W. Martin, now manager of transportation and supplies for Shell Oil Co. of Canada will become transportation manager of Shell Oil Co. and will be responsible for nationwide marine transportation, products pipe line and traffic activities.

DONALD R. LONGMAN has been appointed manager of marketing operations of The Atlantic Refining Co. in announcement made by D. T. Colley, vice president and general manager of marketing.

G. R. WALKER has been appointed treasurer of International Petroleum Co. Ltd. Mr. Walker was formerly with Standard Oil Co. (N.J.) in the treasurer's department and in October 1951, came to International as assistant treasurer. He replaces Mr. Kirkpatrick who has resigned as treasurer so as to be able to devote more time to his duties as a member of the board.

JOHN F. WRIGHT has been named assistant coordinator of chemical products for Standard Oil Co. (N.J.). He will assist Robert M. Jackson, who earlier this month was appointed as Jersey Standard's first chemical products coordinator.

Mr. Wright joined the Jersey Standard organization as a student engineer in 1936. He was transferred to Esso Standard's Bayway refinery as head of the technical department in 1951 and became superintendent of the chemical products department at Bayway in 1953. The following year he was appointed head of the process department with responsibility for the refinery's manufacture of chemical as well as petroleum products.

C. J. Mellendeck

A. H. Tomlinson

Donald Longman

John F. Wright

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SEISMIC GRAVITY MAGNETIC SURVEYS

Fred Holloway

Donald W. Swan

FRED HOLLOWAY has been appointed an assistant general manager of the east coast manufacturing division of Esso Standard Oil Co. Donald L. Ferguson and Daniel L. Hussey will continue as assistant general managers. Mr. Holloway will be succeeded as assistant general manager of the company's Baton Rouge refinery by Donald W. Swan, formerly general superintendent.

Mr. Holloway joined Esso in 1939 as a process engineer at the Baton Rouge refinery from the Massachusetts Institute of Technology, where he had been a research assistant and instructor while fulfulling requirements for his doctor's degree in chemical engineering. Mr. Swan who was previously head of the technical service division at Baton Rouge before his appointment as general superintendent joined the company in 1939.

ROBERT O. GARRETT, a veteran of nearly 30 years in the oil and gas production field, has been appointed vice president and general manager of Texas Gas Exploration Corp. Mr. Garrett has been manager of the exploration and production engineering departments of Arkansas Louisiana Gas Co. in Shreveport.

Robert O. Garrett

J. S. LEONARD, assistant manager of Ohio Oil's Casper, Wyo., division was appointed manager of the company's Tulsa division. He succeeds Edward B. Stewart, who died in Tulsa in September. He is a member of the American Petroleum Institute, Interstate Oil Compact Commission, the South Texas Geological Society and has served as an area oil Industry Information Committee chairman.

J. S. Leonard

THOMAS D. DURRANCE has joined the public relations staff of the Texas Co. For the past year he has been associate editor of *Barron's Business and Financial Weekly*.

C. A. CASH has been elected vice president and assistant to the president of The Shamrock Oil and Gas Corp. according to an announcement by J. H. Dunn, president. Mr. Cash was elected vice president and officer of the corporation at a recent meeting of the board of directors.

C. A. Cash

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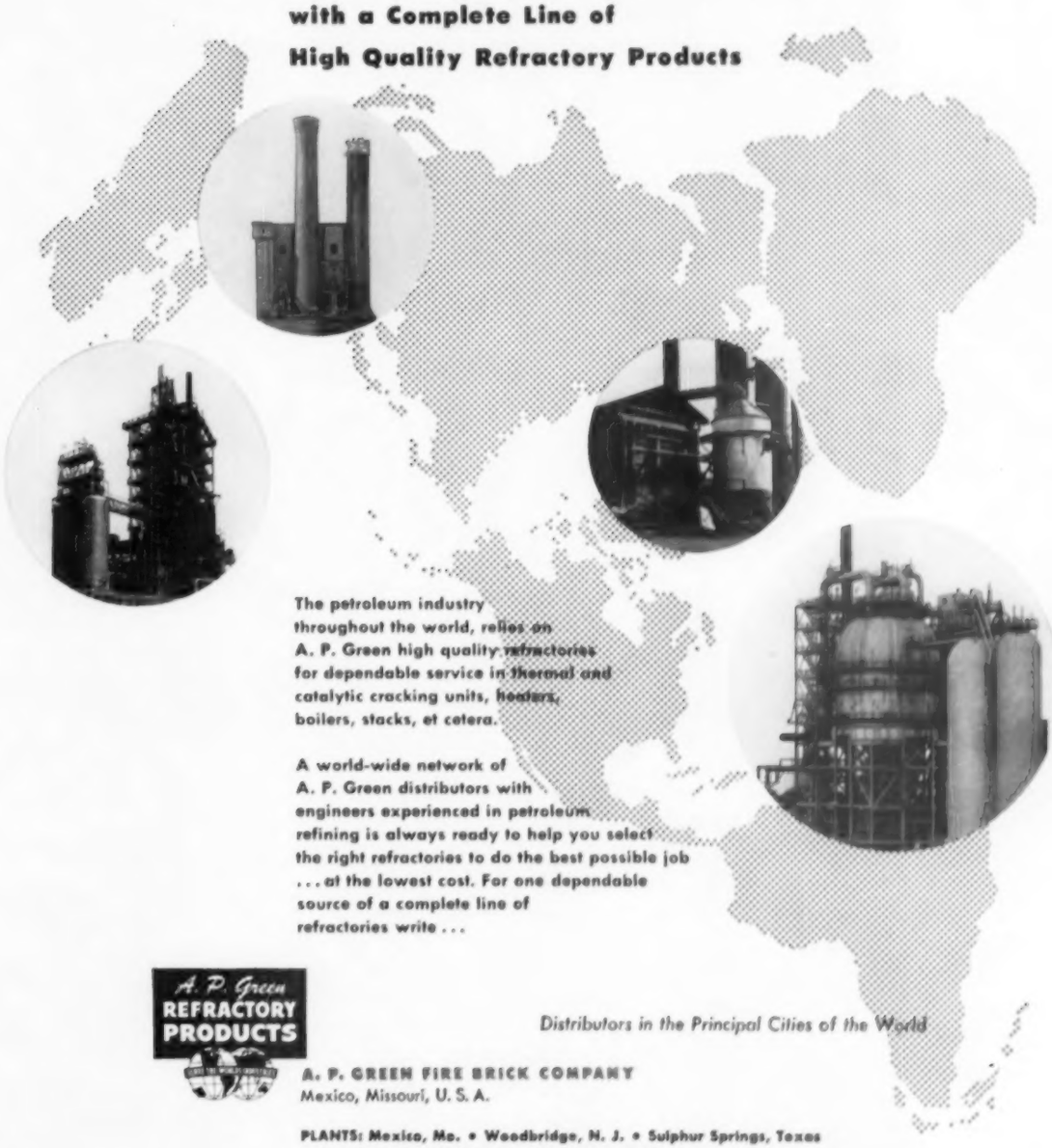

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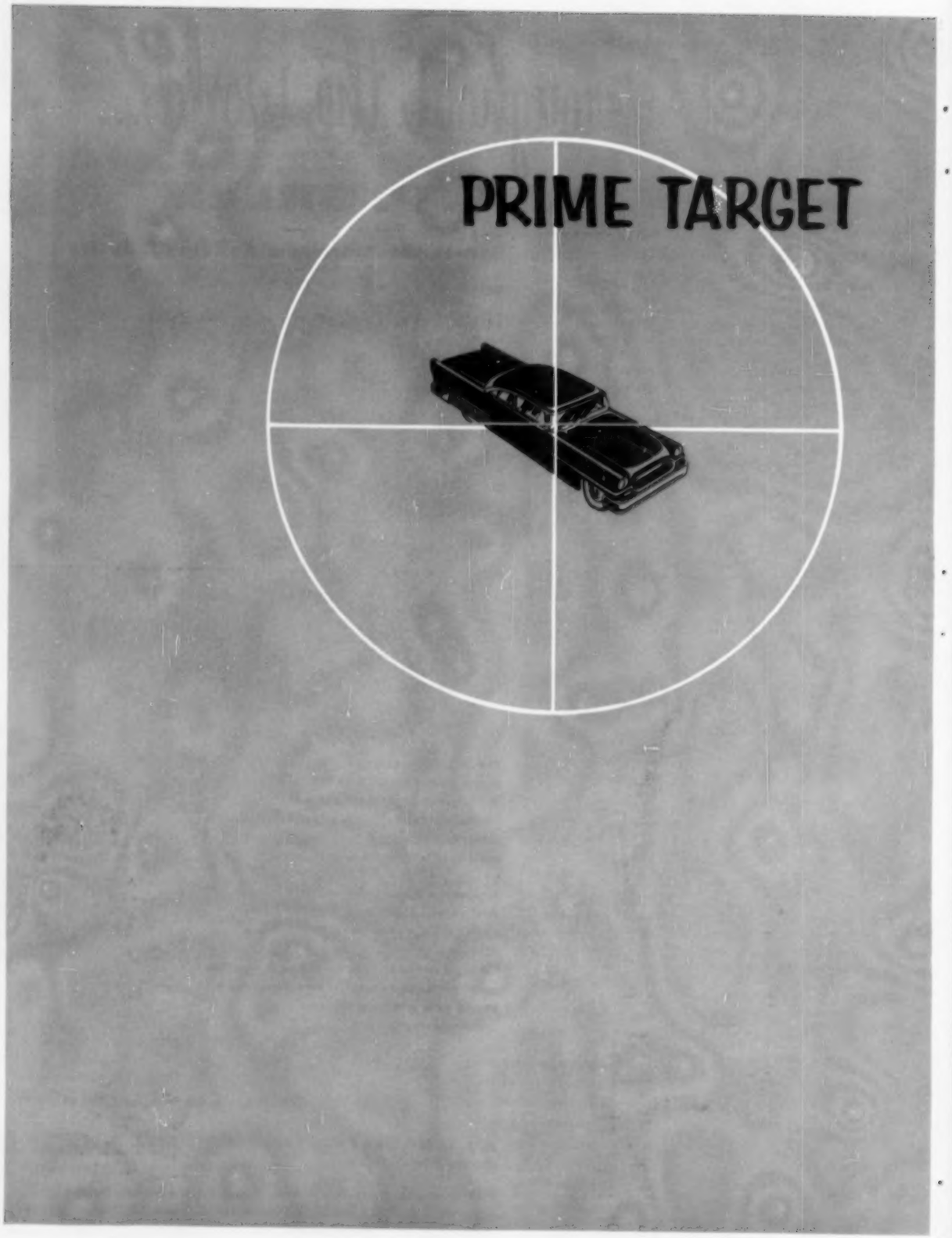
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Refiners, world-wide, now employ Platforming . . . the industry's first successful catalytic reforming process, originated and developed by UOP. The success of Platforming, under the widest possible range of operating conditions, is further evidence of the depth of technical knowledge and practical experience Universal applies to *every* processing problem.

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UOP's latest contribution to modern-day refining is Rexforming. Immediate acceptance of this process for the economical production of super fuels indicates that it is a worthy companion to the many successful processes that Universal's knowledge and technical skills have provided.

Announced this year, Rexforming is rapidly gaining recognition and will soon be contributing to the industry's ability to adequately meet market demands for better, more powerful gasolines.

UNIVERSAL OIL PRODUCTS COMPANY

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Forty Years Of Leadership In Petroleum Refining Technology

B. Bynum Turner

Turner Elected Ethyl Vice President

B. Bynum Turner, vice president in charge of research and engineering of Ethyl Corp., has been elected executive vice president, a new position. He joined Ethyl in 1946 as assistant to the plant manager at Baton Rouge, La., and was named general manager of manufacturing in 1949 and elected vice president in charge of research and engineering in 1951. He is a director of Ethyl Corp. and the Ethyl Dow Chemical Co.

Valve Brochure

Electro-Hydraulics Ltd., Liverpool Road, Warrington, England, has published a brochure describing its electrically operated valves for industrial purposes. The 40-page booklet has been carefully prepared from a technical standpoint to include nomographic and other charts and equations for the solution of hydraulic problems.

D. J. Hall

W. R. Wiley

Appointed McCullough General Sales Manager

D. J. Hall has been appointed to a newly created position of general sales manager for McCullough Tool Company's Pacific and Mountain divisions. W. R. Wiley has been promoted to Pacific division sales manager to coordinate and supervise sales operations in McCullough's five California branches.

Financial Aid for Sale of Tubular Goods

The Export-Import Bank of Washington, D. C., said it is ready to put up $1,000,000 in credit to help Continental Supply Co., Dallas, Texas, to sell tubular goods abroad. The credit will be to help finance sales of tubular goods, machinery and other supplies for the production, transportation, refining and marketing of petroleum gas products.

Under the line of credit, Continental is to obtain cash of at least 20 percent of the value and to participate by carrying at least 25 percent of the deferred payments. The bank is ready to guarantee the remaining 75 percent of the deferred payments.

S. A. Guerrieri

Joins Lummus Technical Staff

S. A. Guerrieri has joined the technical staff of The Lummus Co. He previously was a member of The Lummus Company's process engineering department and later became a professor of chemical engineering at the University of Delaware. Most recently he was chief process engineer of Arthur G. McKee and Co. Mr. Guerrieri will be concerned with general technical liaison with licensor companies, as well as participation in the general advisory and consulting functions of Lummus technical staff department.

Kellogg Research Laboratory Appointments

Christopher J. O'Shea and Peter J. Manno, two recent Ph.D. recipients in Physical Chemistry have joined the catalysis section, petroleum and chemical research laboratory of The M. W. Kellogg Co.

Oil doesn't just happen...

The winning of oil to-day is as finely planned as a military operation, and reconnaissance, assault and consolidation must follow each other with the same precision as on a beach-head.

At every stage of the way you will find 'Gourock' products,—tents of our famous Birkmyre's Cloth for the Survey teams, tarpaulins for protection of their stores; and later on, steel wire rope, the great indispensable. Finally, nylon, manila or terylene ropes and hauling lines for the Tanker fleets, canvas for their sun awnings and windsails, deck swimming-pools of 'Birkmyre's Cloth'—We make them all.

We're proud of the part we play in the oil industry; and just because of that (and because we're proud too of the name 'Gourock' which we've safeguarded over the last 219 years) you can be sure that what ever your stage in oil-winning you're adding to your own peace of mind when you specify 'Gourock'.

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Front-end styling of new S-line light, medium and heavy-duty series (4,200 to 24,000 lbs. GVW)

New INTERNATIONAL S-Line!

New style! The beautiful, new fleet-line design is rugged and functional, built to take the roughest truck work. Choose from a wide variety of two-tone and solid colors to add distinction and prestige to your business.

New comfort! They're driver-designed for greater comfort and easier handling. Power steering, power braking and automatic transmission are optional features, depending on model.

New power! INTERNATIONALS offer more usable horsepower, are able to develop their full horsepower for sustained operation at lower, more economical engine speeds. Every International is all-truck built to do a truck's work—with *no* automobile engines or components to do a truck's job!

World's most complete line of trucks! With the new "S-line" added to the "R-line," you can choose from 185 models up to 70,000 lb. *heavy* heavy-duty trucks including 4-wheel drive, 6-wheel, cab-over-engine, cab-forward, multi-stop delivery types and engines from 83 to 356 hp.

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Medium-duty Model S-152 grain and stock body

Heavy-duty Model S-170 dump truck

Medium-duty Model S-160 walk-in van

Ask your International dealer for a demonstration or write for catalog specifying model

INTERNATIONAL TRUCKS

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R. T. Burton

D. J. Jacobs

G. L. McCoy

J. A. Parrish

Stanvac Creates New Posts

An organizational change involving the creation of five new top management posts at its New York headquarters office was announced recently by Standard-Vacuum Oil Company.

Under the new administrative set-up which Horry F. Prioleau, president, said has been under study for more than two years, the countries and territories where Stanvac does business are grouped into five major areas. Each now has a regional coordinator at New York in charge of all phases of the company's integrated oil operations within his area. The coordinators report directly to the Stanvac board, and will work closely with the overseas managers who carry on-the-ground responsibility for the various operations such as exploration, producing, transportation, refining and marketing.

The men named to fill the new Stanvac posts are:

Rufus T. Burton, regional coordinator for Stanvac's South Asia and East Africa regions, including India, Pakistan, Ceylon, Burma; the East African countries from Tanganyika to the Red Sea, and Madagascar: Mr. Burton's most recent assignment was as general manager at Bombay for the company's marketing operations in India and nearby.

James D. Jacobs, regional coordinator for Australia, New Zealand and the Pacific islands: Mr. Jacobs served formerly as managing director of two of Stanvac's subsidiary companies in Australia. His assistant will be Percy I. DuMar, marketing executive whose previous post was in Sydney. Mr. Jacobs will also act temporarily as coordinator for the Southern Africa region including the Union of South Africa, the Rhodesias and Portuguese East Africa (Mozambique), with C. B. Simpson serving as his assistant for that area.

Gerard L. McCoy, regional coordinator for Southeast Asia, including Indonesia, Malaya, Thailand, and Indo-China: Mr. McCoy served until recently as the company's general representative in Indonesia, where Stanvac has extensive crude producing and refining operations. He will be assisted in his new assignment by W. Walker Geddes, who likewise has seen many years of service in Southeast Asia countries.

Joseph A. Parrish, regional coordinator for Stanvac's Far East region, including the Philippines, Japan, Korea, Formosa and the Colony of Hong Kong: Mr. Parrish was formerly general manager of marketing operations in the Philippines. George W. Behrman, his assistant, has seen many years of service in Japan.

In announcing the names of the four Stanvac veterans who will fill the new positions, Mr. Prioleau commented that the rapid growth of the company's business, coupled with the complexity of economic and other post-war problems in some of the countries of South and Southeast Asia and the Far East, were dominant factors in bringing about the management realignment.

Since the company was formed in 1933, its sales volume has more than tripled, crude production is up 235 percent, and refining capacity has grown to more than five and one-half times its former size. The company's capital budget for this year was eight times its 1934 budget, Mr. Prioleau said. Stanvac did a gross business of more than $700 million last year.

W. L. Hughes Heads Halliburton Lubbock Division

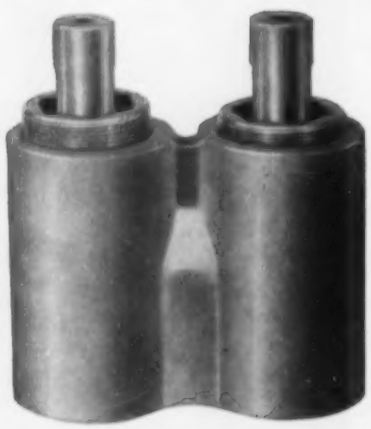
New manager of Halliburton Oil Well Cementing Co.'s Lubbock division is William L. Hughes, Halliburton president L. B. Meaders announces. He succeeds the late C. T. McGuire, who died May 31. The new division manager was employed by Halliburton in 1938. Halliburton's Lubbock division includes part of Texas and all operations in New Mevico.

Halliburton Transfers Joe Maly

Joe W. Maly, Halliburton Oil Well Cementing Co.'s assistant division manager at Oklahoma City, is transferring to Denver to serve in the same capacity in Halliburton's Rocky Mountain division. He will assist Obie L. Stalcup, Rocky Mountain division manager, and replaces J. W. Hall, former assistant division manager who is on sick leave.

Replacing Mr. Maly at Oklahoma City is George S. Battles, former customer contact representative for Halliburton's Oklahoma division.

For Oil Refinery & Chemical Plants



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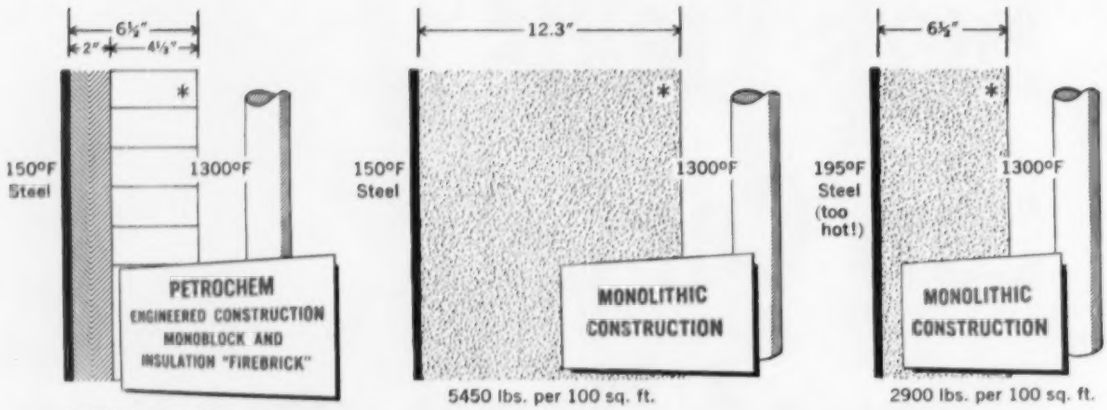
In furnaces as in processes compare the design to judge the advantages

As an example:

The wall construction of all Petrochem-Isoflow Furnaces is designed for 150°F maximum outside shell temperature.



*Based on B & W values.

The Petro-Chem design provides a thoroughly engineered wall construction. It is built with two tiers of monoblock supported on 18 inch centers and a circular arched wall of insulating firebrick. The inside of the steel shell is protected from the possibility of corrosion by a one-eighth inch thickness of Staylastic cement. This type of construction, independently supported monoblock and the circular arch of firebrick, bonded with Smoothset mortar, assures optimum efficiency and minimum maintenance.

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Also, this construction has low heat storage capacity, speeds both heating and cooling. Its light weight requires less concrete foundations and steel supports.

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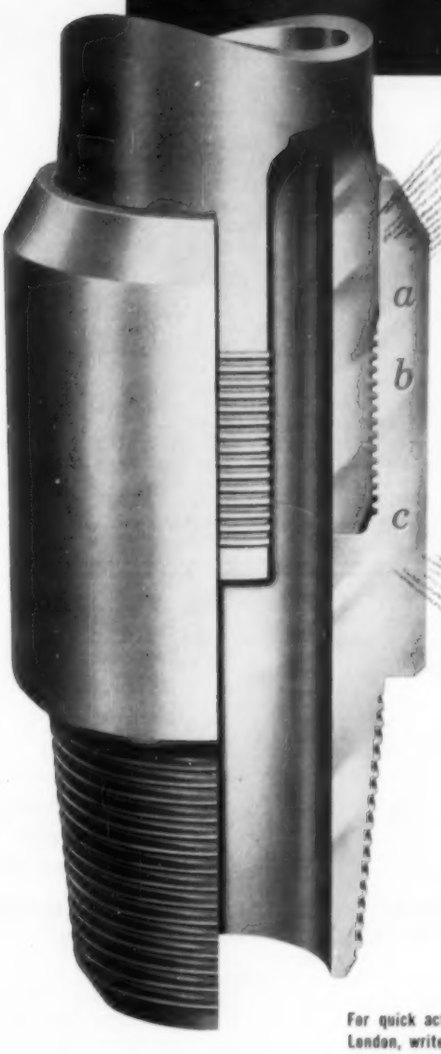

protects your drilling string investment—against twist offs, against washouts, against leaks

BECAUSE: *a.* The Shrink-Grip "safety area" supports the drill pipe beyond the threaded section . . . and seals against leakage. *b.* Entire thread length is protected by seal at each end. *c.* Fixed landing shoulder assures proper make-up . . . and effects a seal.

extends your drilling string investment to drill "extra wells"

BECAUSE: The "field replaceable" feature of the Reed Super Shrink-Grip Tool Joint enables the operator to: 1. SAVE PIPE by reversing ends before excessive slip wear; 2. SAVE PIPE by replacing tool joint damaged by careless handling; 3. SAVE TOOL JOINT when pipe is bent or crushed; 4. SAVE PIPE when tool joints wear out after they have served their time in giving long trouble-free service.

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W. Samuel Carpenter, III

Du Pont Sales Appointment

W. Samuel Carpenter, III, has been named assistant director of sales of the du Pont Company's petroleum chemicals division to succeed M. H. Campbell, who has been transferred to the new isocyanates sales section in the elastomers division. The new assistant director of sales comes to the petroleum chemicals division from du Pont's textile fibers department where he was director of manufacturing for the cellulosics division.

Houdriformer on Stream

Sun Oil Company has completed an 18,000 barrel Houdriformer unit at its Marcus Hook, Pa., refinery at a cost of $5 million. By-product hydrogen will be used in the manufacture of anhydrous ammonia in a new $9 million plant scheduled for completion by Jan. 1. Earlier this year, Sun placed on stream the world's two largest Houdriflow catalytic cracking plants at its Marcus Hook and Toledo refineries.

A. Williams

J. Wall, Jr.

New Otis Appointments

Otis Pressure Control, Inc., Dallas, has announced two new appointments in its New Iberia, La. and Odessa, Texas, divisions. Adam Williams has joined the sales department at New Iberia, and John Wall, Jr. has been appointed a service specialist and transferred to Odessa. Mr. Williams was formerly a wire line specialist.

Reformer Feed Preparation

Preparation of petroleum feeds for platinum catalysts is the title of a 12-page technical study just published by Minerals & Chemicals Corporation of America, Philadelphia. Discussion covers the reduction or removal of arsenic, lead, sulfur and nitrogen compounds.

Houston D & D Election

The Houston Desk and Derrick Club, with 500 members, largest in the organization, has elected Miss Gladys Watford of Johnston Oil & Gas Co. as president. She succeeds Mrs. Leah Wilson. Other new officers are Mrs. Jean Heinselman and Mrs. Dixie Ware Green, vice presidents; Mrs. Grace Bingham, corresponding secretary; Mrs. F. T. Brandon, treasurer; and Miss Frances Page, recording secretary.

A. W. Carroll

Otis Staff Assistant

A. W. Carroll has been appointed a staff assistant in the engineering department of Otis Engineering Corp., Dallas, manufacturing affiliate of Otis Pressure Control, Inc. He formerly was liaison engineer.

Cooling Tower Standards

The Cooling Tower Institute has issued three publications of industrial standards for recommendation to purchasers and manufacturers of industrial water-cooling towers. These documents are the result of a five-year program of research conducted by the technical committees of CTI. One year of preliminary study and three years of field investigation were followed by another year of intensive field testing and statistical analysis. Copies are available from the Institute at 444 Emerson Street, Palo Alto, Calif.

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Interior view of Northern Natural's Mullinville Station, showing 2,000 hp Cooper-Bessemer GMWA and panel used for automatic single-switch compressor operation.

FULLY *Automatic!*

. . . Latest COOPER-BESSEMER GMWA

Compressor Station Development . . .

Now, by merely energizing a *single*-switch control, a 2,000 hp Cooper-Bessemer engine-driven GMWA compressor is started and put on line. That's exactly what takes place at Northern Natural Gas Company's mainline station in Mullinville, Kansas . . . worked out jointly by Northern Natural and Cooper-Bessemer.

This will be welcome news to all who are familiar with the intense competition between different methods of moving gas through pipe lines. It means you can now continue to experience the greatly superior fuel economy of the reciprocating gas engine and at the same time benefit from all the other economies claimed for competing equipment.

Impressive results at Northern Natural are typical of the Cooper-Bessemer development work that continues day after day. Next time you need heavy-duty engines or compressors, first find out about the *newest* advancements being offered by one of America's oldest engine builders . . . Cooper-Bessemer. Detailed information and complete-line bulletins are readily available from the Cooper-Bessemer office nearest you.

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... with quantitative calibration for more
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1950 — Developed SIMULTANEOUS RADIATION LOGGING
... utilizing a pure neutron/neutron to avoid
faulty phenomena of detrimental gamma rays

1951 — Developed FOUR-RESISTIVITY-CURVE ELECTRICAL LOG
... employing an S. P. curve of greater detail
for more accurate analysis of formations

1952 — Developed JUMBO SIDEWALL CORE SAMPLING
... with larger cores more precisely located
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1954 — Developed "MIGHTY MOUSE"—CHAMP OF THE MIDGET GUNS
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Gainesville, HO-5-2501 — Odessa, 6-6428 — Beaumont, 2-4263 — Victoria, HI-5-1972 — Graham, 1728 — Pampa, 4-9932 — Colorado City, 790
LOUISIANA: Shreveport, 3-1648 — Lake Charles, HE-9-4724 — Lafayette, 4-2396 — Houma, 2-2771. KANSAS: Great Bend, 4306 — Liberal, 4822
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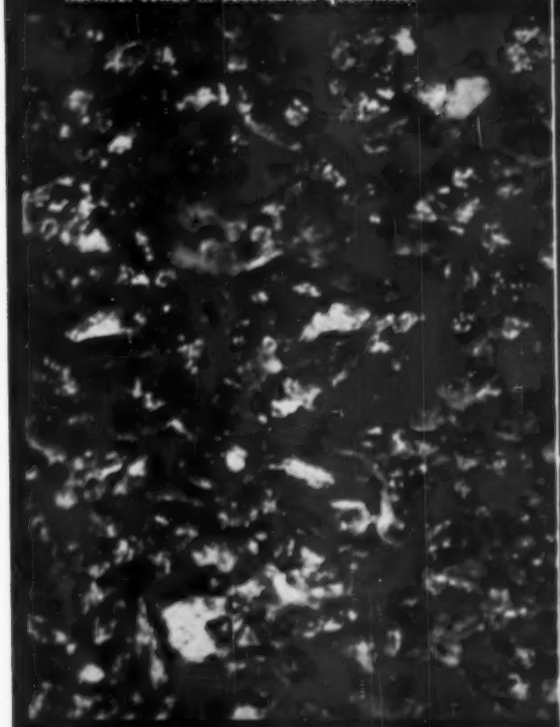
quantitative and qualitative PROOF

1. That "clean," ready-to-refine crude oil often contains harmful solids in substantial quantities.



The photomicrograph above (70X) shows the solids, or sediment, contained in about one half quart of supposedly "clean" refinery charging stock.

2. That they are effectively removed by PETRECO Electric Desalting.

This photomicrograph (also 70X) shows the sediment remaining in the same quantity of oil after it had been purified by Petreco Electric Desalting.

The removal of harmful solids from charging stock is an additional benefit derived from the use of Petreco desalting. In addition to removing 95% to 100% of the salts, Petreco desalting also insures against plugging and abrasion damage from solids such as those illustrated above. Along with the salts, these detrimental substances are brought together in the electric field, caused to associate with the water phase and are eliminated in the effluent water.

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The Thornycroft organisation with its ability to provide Specialised Transport is constantly called on to produce trucks to the exacting requirements of the Oil Industry. In addition to the "Big Ben" shown here, a 6 x 6 version of the "Nubian" cross-country chassis has recently gone into service, making our already wide range yet more comprehensive.

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Public Relations Merger

James A Clark Co. of Houston, the only public relations consulting firm specializing in oil and gas company accounts, has marged with another Houston public relations firm, George Kirksey & Associates, to form Clark, Kirksey & Company.

Senior partner in the former James A. Clark Company, Mr. Clark is widely known as a petroleum historian and writer. He is the author of several best-selling books in the field and is a columnist of national reputation.

Partners in the new public relations firm are, in addition to Mr. Clark, John D. Kemp and Hal Hazelrigg from the former Clark Company and George Kirksey, Patrick J. Nicholson, III, and A. D. Bruce, Jr., members of the Kirksey firm.

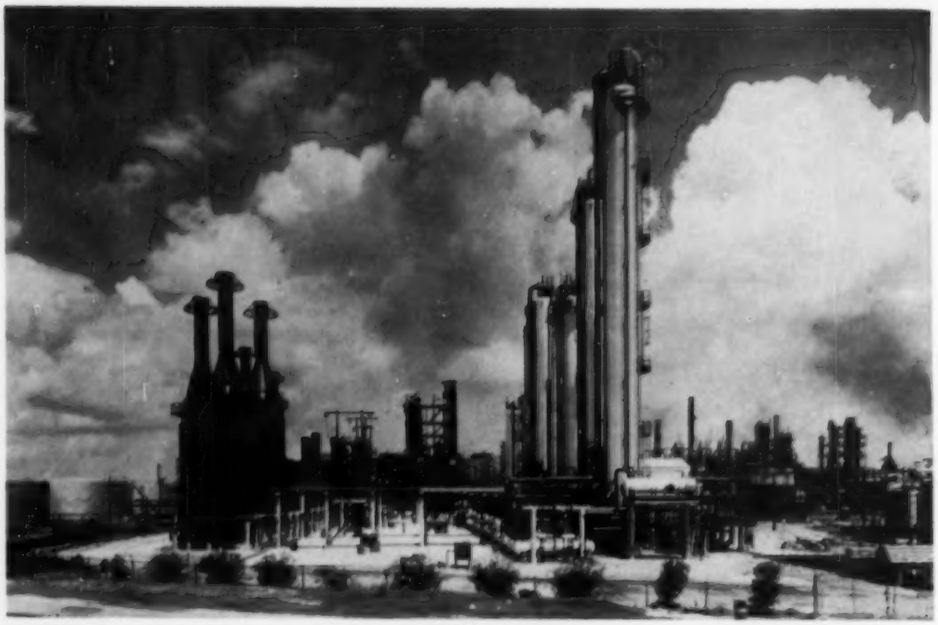
Expand Rubber Plant

Phillips Chemical Co. will expand by 15 per cent its Plains copolymer plant near Borger, Texas. Construction of the new facilities will begin immediately and is expected to be completed by September 1956. The copolymer plant and the adjacent butadiene plant were purchased by Phillips from the government in April 1955. Phillips had previously operated the plants for the government under contract.

August Octane Ratings

Gasoline on sale at service stations in August showed a nationwide weighted average of 95.9 octane number for premium and of 88.5 octane number for regular, according to the latest monthly survey of gasoline antiknock quality compiled by Ethyl Corporation.

Premium gasoline was 0.1 octane number higher than its corresponding July average while regular gasoline was unchanged. Compared with August 1954, premium gasoline was 2 octane numbers higher and regular gasoline was 1.6 octane numbers higher. Average tetraethyl lead contents in August were 2.59 ml per gallon of premium gasoline and 2.27 ml per gallon of regular gasoline.



Gulf Oil Corp. has put into operation a new 29,000 b/d Platformer at its Port Arthur, Texas refinery. The unit will make blending stocks for aviation gasoline as well as for automotive fuels. Designed by Universal Oil Products Co. and erected by Fluor Corp., the Port Arthur installation is the largest of its type so far built.

U.S. Refinery Capacity

Capacity of United States refineries increased 400,000 b/d in 1954 to 8,420,630 b/d on December 31, according to a survey completed by the U.S. Bureau of Mines. Capacity under construction on that date was 146,800 b/d. Copies of the report may be obtained by writing the Bureau of Mines, Publication Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa. asking for Information Circular 7724.

Louisiana Secondary Recovery

The Interstate Oil Compact Commission has published a "Summary of Secondary Recovery Operations in the State of Louisiana During 1953," prepared by the Secondary Recovery Committee for Louisiana, under the direction of H. L. Kirkpatrick, chairman. Copies of this report may be obtained from the Headquarters Office of the Interstate Oil Compact Commission, Box 3127, Okla. City 5, Okla.

G.E.C.

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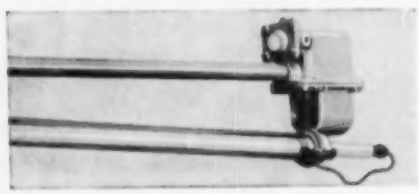

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New Veedol 10-30 is the culmination of over three quarters of a century of petroleum progress. Building pipelines, sinking wells, building refineries, the producers of Veedol have grown from a tiny enterprise in America's first field to a major oil company with producing facilities in a dozen different states and distributing centers throughout the world.

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Packard Steam Generators

A 16-page catalog on a new series of Foster Wheeler packaged steam generators in sizes 10,000 to 46,000 lb. steam per hour gives capacities, dimensions, construction features, instrumentations, accessories, sectional drawings and installation photographs. It contains also a chart for selection of firing equipment and controls and a typical proposal. Copies may be obtained from the Foster Wheeler Corp., 165 Broadway, New York 6, N. Y.

Michigan Refiners Combine

Leonard Refineries, Inc., Alma, Mich., Mid-West Refineries, Inc., Grand Rapids, and Roosevelt Oil and Refining Co., Mt. Pleasant, are planning to merge. Stockholders of the latter two companies are to be offered stock in Leonard.

Microwave Radio Manual

A new 226-page service manual on wave propagation and other aspects of VHF and microwave radio relay systems has been prepared by the government service department of the RCA Service Co., Inc., Camden, N. J. The publication, titled "Point-to-Point Radio Relay Systems—44C to 13,000 MC", originally was published under contract for the Air Force which has approved the reprinting and commercial sale of the volume. Price is $2 postpaid.

Synthetic Rubber Research

Shell Chemical Corp. has organized a manufacturing research unit in the synthetic rubber field at the Torrance, Calif. plant, C. W. Humphreys, manufacturing vice president, announced recently. John Anderson, formerly research director of Shell Chemical's Houston laboratory, will be director. D. S. Melstrom will head the chemistry section, F. D. Moss the process and pilot plant section, E. T. Bishop the production section and L. R. Beason and W. L. Holmes will be group leaders.

N. H. Erwin

McCullough Promotion

N. H. Erwin has been promoted from Pacific division service manager to general service manager, Pacific and Mountain division, with headquarters in Los Angeles, according to I. J. McCullough, president of the McCullough Tool Co. Mr. Erwin has had 32 years' experience in the oil industry and 18 years with McCullough.

Complete Platformer

A 2,500-barrel UOP Platforming unit, designed to produce a high octane blending component, has gone into operation at the Texas Gas Corporation's plant at Winnie, Texas. A naptha cut derived from the company's gas processing plants is being upgraded for use as a blending material. Universal Oil Products Co. engineered, designed and licensed the Platformer. Procon Inc. was the contractor.

Sea Water Distillation Unit

Potable water is now produced from sea water on the off-shore tender "Jack Cleverly" by using waste heat from the mud pump diesel engines. In a new type of Cleaver-Brooks waste-heat evaporator, sea water is "flashed" into a vacuum chamber, and the resulting steam is then condensed on cooling coils as distilled water. It requires no source of heat other than engine jacket-water heat which is normally wasted. The "Jack Cleverly" was built by the Levingston Shipbuilding Co.

Plan Gas Products Plant

Texas Butadiene & Chemical Corp., Houston, will build a $26 million alkylate-avgas and butadiene plant in the Houston area. Estimated date of completion is December 1956. E. L. Green, Jr., vice president of a Cabot subsidiary, Cabot Carbon Company, has been elected president of the new company.

Capacity of the new plant will range from an annual production of 2,500,000 barrels of avgas with 17,000 tons of butadiene, through diminishing quantities of avgas and increasing quantities of butadiene to an annual 43,000 tons of butadiene alone.

Principal raw materials will be normal butane and iso-butane which will be dehydrogenated by the Houdry process. Design engineer and contractor for the new plant is The Fluor Corporation, Ltd.

Indiana Water Flooding

The Interstate Oil Compact Commission has published a "Summary of Water Flooding Operations in Indiana During 1953," prepared by the Secondary Recovery Committee for Indiana, with Homer R. Brown, supervisory of the oil and gas division, Indiana Department of Conservation, as chairman, and J. R. Vaughn, Sun Oil Co., as secretary. Copies may be obtained from the headquarters office of the Interstate Oil Compact Commission, Box 3127, Oklahoma City 5, Okla.

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The Perplexing Second Baku

(*Continued from page 114*)

Further Developments: The Chkalov province extends over the whole southern slope of the Urals into central Asia. The northernmost and southernmost corners alone are of importance, as there are located, respectively, the Buguruslan oil area and the Orsk refinery (the largest processing plant in the "Eastern District."

The Buguruslan deposits lie in the Upper Permian and are believed to be the richest accumulations discovered yet in this formation. The Kungur layers here are also oil-impregnated. Like the other Permian oil in this basin, the Buguruslan crude has a high sulfur content. The main oilfields developed in this province are at Buguruslan and Sultangulovo. Inasmuch as these formations carry several oil horizons, the oil area may expand when the government affords the means to drill deeper and extends operations into the southern outskirts of the Volga-Urals Basin.

The Chkalov oil industry is under the technical direction of the Buguruslanneft Oil Union. The Orsk refinery is an industrial unit by itself.

Saratov Province is relatively better known for its rich gas deposits, located on the Volga's right bank, which have supplied Moscow since the construction of a long pipe line in 1947. As the discussion of gas deposits is outside the scope of this article, here will be mentioned only the latest developments in the oil industry. During the past three years, oil production was begun at Trofimosky (eight miles from Saratov) while the deposits at Shigulev and Pugachev have been further expanded. The latter fields are located between the Volga and Irghiz rivers, in the northeast part of Saratov province. As in the Samara formations, oil is accumulated here in the lower layers of the Middle Carboniferous and in the Devonian. Further increases in known reserves in the near future may be expected. Quick development of this area cannot be predicted because of equipment shortage.

The administration of the Saratov oil sources is entrusted to Saratovgasneft which simultaneously directs the gas industry. The construction work is carried out by the Saratovgasneftstroi, a trust which is also in charge of the badly neglected housing construction.

Oil now is produced also from the lower Volga regions as far down as Stalingrad. Here has been set up recently the Stalingradneft Oil Union and, according to official claims, the oil output should double this year as compared with 1954. These regions cannot be included in the Volga-Urals Basin, however, for they belong, geologically as well as administratively, to the expanding North Caucasus oil industry.

Automation

Automation in the petroleum and chemical industries is the subject of the current *Kelloggram*, published by the M. W. Kellogg Co. of New York. Diagrams are used throughout to illustrate clearly the basic functions of instruments used in automatic control. One section, for example, describes the use of radio-isotopes in level measuring devices, a relatively new development in the petroleum and petrochemical industries.

Another section discusses data reduction systems. Other subjects covered are: electronic instrumentation, stream analyzers and high pressure instruments.

Copies of the *Kelloggram* on automation may be obtained from the advertising department, The M. W. Kellogg Co., 225 Broadway, New York 7, N. Y.

Oil Well Heaters

An electric oil well formation heater has been developed by the Westinghouse Electric Corp. to revive or improve oil production from wells plugged with wax. Lowered into a well to depths of previous production, the long Corox tubular heaters raise the temperature of the oil, thereby melting the wax-like plugging material lodged within the oil sand.

A total of 24 heaters has been operating in oil wells in Montana for the past 12 months and the oil production from most of these wells has been doubled after only a few hours of heating, it is claimed.

New gamma ray projector announced by The M. W. Kellogg Co. weighs only 75 pounds and can be carried and positioned by hand.

Gamma Ray Projector

A portable gamma ray projector has been placed on the market by The M. W. Kellogg Co. which has used prototypes of the new projector for some time to check welds before a processing unit is put into operation.

The projector is being made in three sizes, 75 pounds, 250 pounds and 2,900 pounds. It will be marketed through Kellogg's recently-formed Nuclear Products Division. Exclusive sales agent is Metal & Thermit, New York.

The projector is shielded with lead, the thickness of its walls depending on the strength of the isotope to be employed. It has a lensless shutter that can be opened and closed remotely. The projector is charged in a radio-isotope laboratory by inserting a small metal capsule that contains the proper amount of the radio-active isotope, called a "source." Gamma rays escape from the small capsule and fill the camera's chamber, but are held in check by the lead walls.

When welding of a large vessel is finished, for instance, segments of conventional x-ray film are placed around the weld on the outside of the tank in a special continuous belt developed by Kellogg. The isotope-containing projector is positioned inside the vessel and opened for the proper exposure time necessary to penetrate the metal and expose the film. Immediately after exposure, which may vary from minutes to an hour depending on thickness of the metal, the film is developed on the spot and examined for construction flaws while the welding crews are still there. On one job Kellogg radiographers in a single exposure took 160 pictures in two hours and 45 minutes.

Cosden to Build Rexformer

Cosden Petroleum Corp. has signed a license agreement with Universal Oil Products Co. for the installation of a Rexforming unit which has a design capacity of 3,868 barrels per stream day. The Rexformer is scheduled to produce a 98 F-1 clear octane blending component to upgrade the quality of Cosden's gasolines. Blending material is now being produced in a UOP Platforming unit, which will be converted to operate 100 per cent of the time to prepare aromatic feed stock for an integrated Udex unit.

Straight run gasoline derived from crude distillation, natural gasoline, and miscellaneous butane and pentane fractions will be charged to a five-tower prefractionation section which will produce feed stock for the Rexforming unit; as well as Platformer feed stock to produce benzene, toluene, and xylenes, and butanes, isopentanes, and normal pentanes used in the production of aviation gasoline.

Cosden also is building, with refinery personnel, a 1,600 B/SD Unifining unit which will be used to desulfurize part of the feed stock for the Platformer, and to furnish a portion of the feed stock to the Rexforming unit.

The Rexformer, which is being engineered and designed by Universal will be built by Procon Incorporated, and is expected to be in operation by late next spring. The Unifining unit is due to go on stream shortly.

C. M. Reagle

Heads New York Domestic Territory

The assignment of C. M. Reagle as district manager of Cooper-Bessemer's New York domestic territory has been announced by Stanley E. Johnson, Sr., vice president of The Cooper-Bessemer Corp., Mount Vernon, Ohio. Presently a vice president and director of Cooper-Bessemer, Mr. Reagle is also manager of marine sales. He has been with the company since 1922.

In Situ Combustion Study

Standard Oil Co. of California is undertaking a pilot scale experiment in *in situ* combustion for secondary recovery. Experiment will be in the Midway-Sunset field which produced 20 gravity crude. Plan is to use a four-well pattern with one air input well and three producers. Observation wells between these will be drilled to check combustion progress.

L. D. Snyder Joins Joy

Joy Manufacturing Co., Oliver Building, Pittsburg, Pa., has announced the appointment of Lenard D. Snyder as chief engineer, oil field products, with headquarters in the company's plant. He has been with George E. Failing Supply Co., Continental Oil Co., and Drilling Accessory and Manufacturing Co.

Sinclair Refining Co. has developed an expendable polyethylene plastic sack containing a pound of lubricant that can be dropped into Diesel locomotive traction gear cases, thus making the servicing operation a one-step procedure. When the gears mesh in motion, the bag disintegrates and becomes part of the grease mass.

Unit for Off Shore Drilling

Offshore Service

The McCullough Tool Co. has recently completed a versatile marine wire line service unit for offshore drilling. The new unit revolves on a circular track mounted on a barge. Being able to turn a full 360 degrees, the unit can efficiently service a well from any desired angle. The service unit has 20,000 feet of wire line and includes electronic equipment and measuring devices to perform all McCullough wire line services and McCullough radioactive logging.

The barge itself is 100 feet long and 26 feet wide. A McCullough tug tows the barge to the rig location and picks the barge up again after the job has been completed.

Hypalon Rubber

Data about Hypalon, a new elastomer, is given in a new bulletin "Facts About Hypalon" published by the elastomers division of E. I. du Pont de Nemours & Co., Wilmington, Del. The division regularly publishes bulletins giving technical details about neoprene under the title "Neoprene Notebook."

M. A. Ellsworth

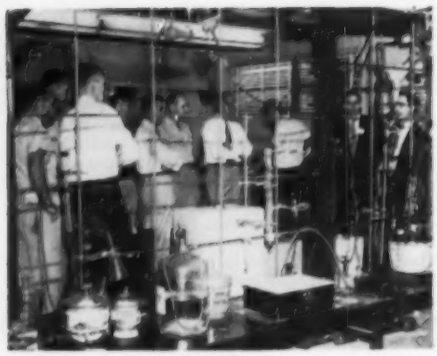
New Fluor Division

Engineering and construction operations of The Fluor Corp., Ltd., Los Angeles, are being combined into one division under the direction of M. A. Ellsworth as vice president and general manager. He has served as vice president in charge of the sales division since November 1952.

Reporting to Mr. Ellsworth will be J. G. Marshall, vice president, general engineering; Ernest Moncrief, vice president, mid-continent division; Lee Van Horn, vice president, process engineering and development; W. P. Downey, vice president, construction; and J. P. Kneubuhl, vice president engineering and constructions sales. Mr. Kneubuhl is presently vice president, eastern area sales.

Heads Orbit Sales

L. E. Wallace has been appointed sales manager for Orbit Valve Co., Tulsa. He previously was district manager at Houston where he has been succeeded by Ralph H. Soape, assistant manager.



Chemical Cleaning

Chemical Cleaning Symposium

Fifty of the nation's top petroleum refining authorities attended a refinery chemical cleaning symposium in Tulsa August 18 and 19 as guests of Dowell.

Also attending the symposium were representatives of M. W. Kellogg and Foster-Wheeler companies. Dowell specialists from New York, Chicago, Cleveland, Houston, New Orleans, St. Louis and Philadelphia served as consultants. Dowell offers industrial chemical cleaning from more than 170 services and sales locations throughout the major oil producing and industrial areas of the United States and Canada.

Appointed to New Ideco Position

King D. Boyd has been appointed manager of technical service, a new key position at Ideco headquarters in Dallas. Mr. Boyd has been closely associated in the recent development of diesel-electric power for drilling equipment and was for the past seven years petroleum sales manager for Stewart and Stevenson, oilfield engine distributors of Houston.

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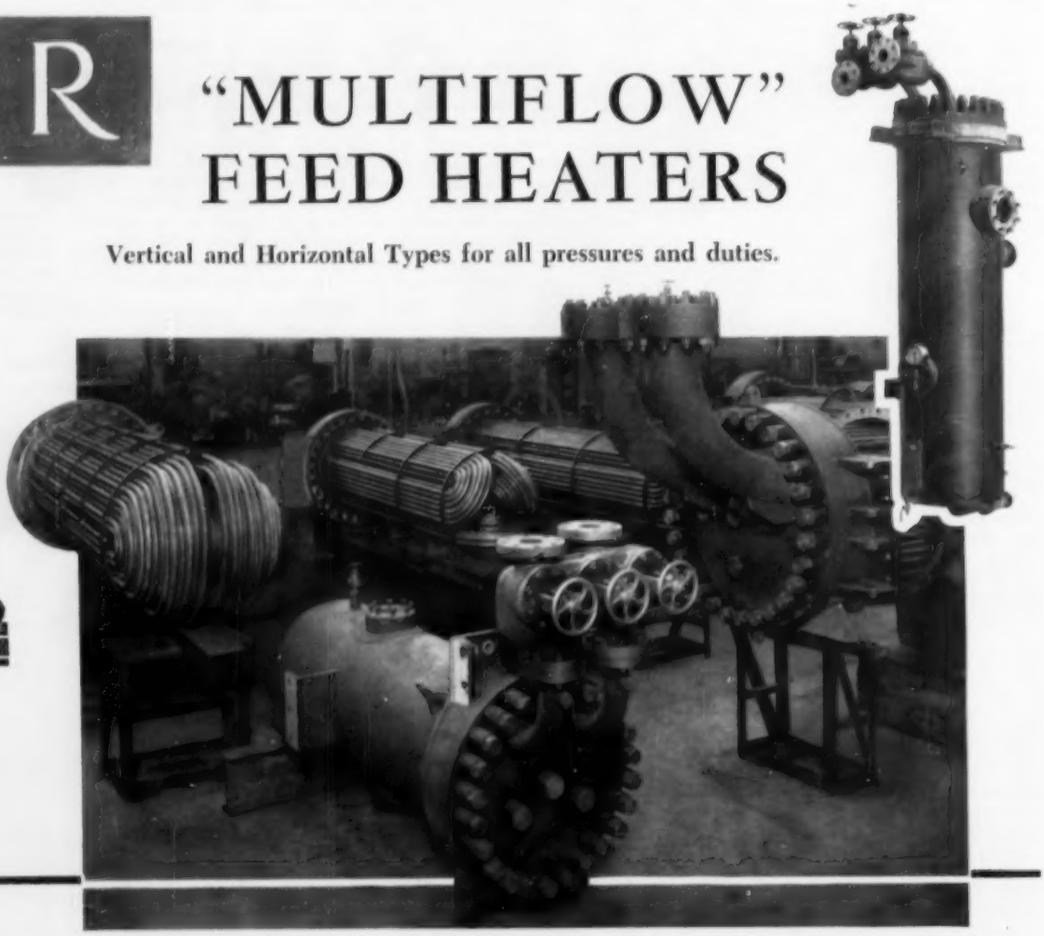
"MULTIFLOW" FEED HEATERS

Vertical and Horizontal Types for all pressures and duties.



Feed heating saves heat from exhaust steam, and uses heat in steam bled from engines or turbines more efficiently than in the prime mover itself. Adequate feed heating means higher thermal efficiency, smoother operation of pumps and other auxiliaries, increased boiler efficiency and longer life to plant. Weir Feed Heaters are made in single- and multi-stage types for exhaust or bled steam.

Write for Publication No. IL. 152.

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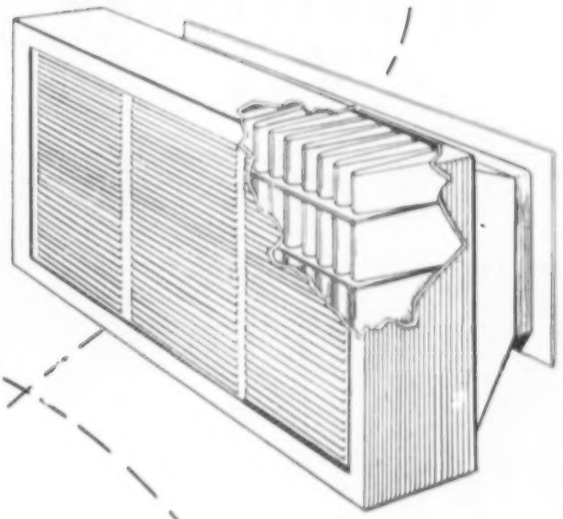
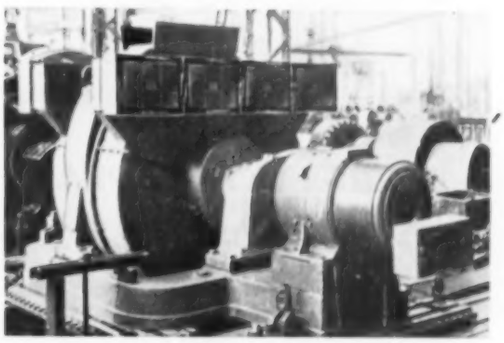
In the blinding desert dust storms which sweep the area of the Iraq pipelines, VOKES filters have twice been chosen for the important task of protecting pumping stations and ancillary equipment . . . proof indeed of the important part which VOKES filtration is playing throughout the world in safeguarding plant and machinery from wear, breakdown and unnecessary depreciation. Below are shown three typical aspects of VOKES protection . . . protection which cannot be jeopardized by the non-availability of element replacements because VOKES FILTERS ARE CLEANABLE.





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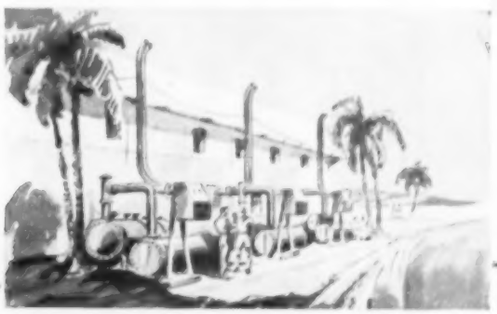
Electric motors breathe too! . . . and these VOKES filters have proved conspicuously successful in preventing the grave damage hitherto sustained during operations in impure air conditions.

VOKES FILTERS FOR ANCILLARY EQUIPMENT

Compressors . . . portable generators . . . welding sets . . . power packs . . . all need protection against the ingress of abrasive dust, whether by air-intake, lubricating oil or fuel.



VOKES FILTERS FOR STATIONARY DIESEL ENGINE

Under abnormal conditions like these, engines have to be doubly protected and these large diesel engines are therefore fitted with Microvee dry fabric filters for cleaning the intake air. Vokes Filters are also specified for atmospheric air filtration in the ventilating systems of many of the desert buildings.

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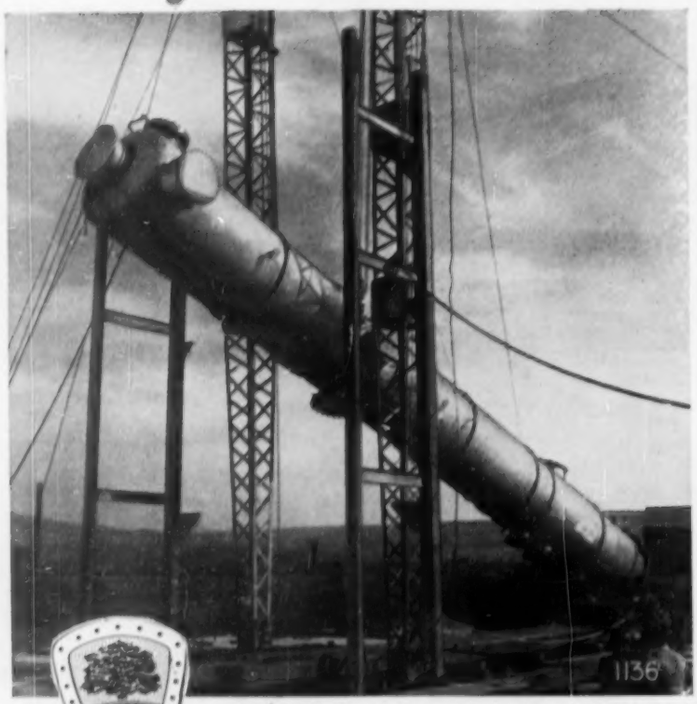

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Scores in hand, hundreds in service.

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Many in hand and hundreds in service.

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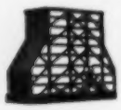

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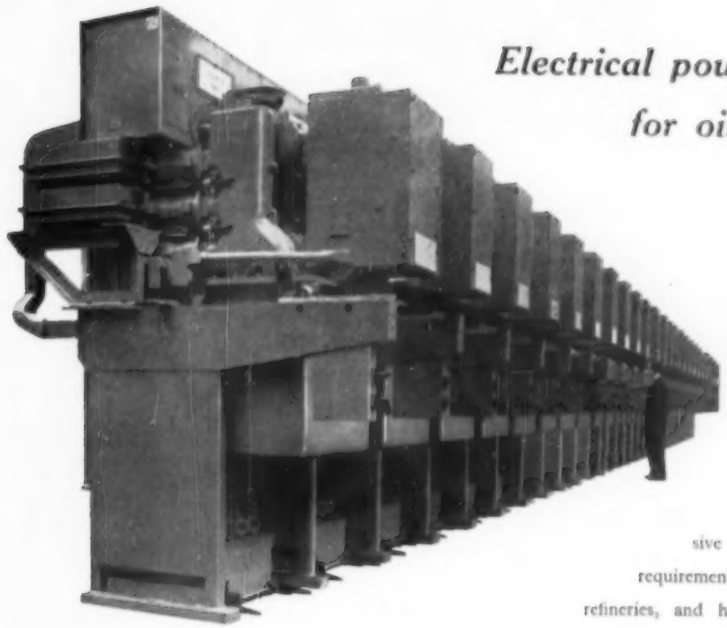

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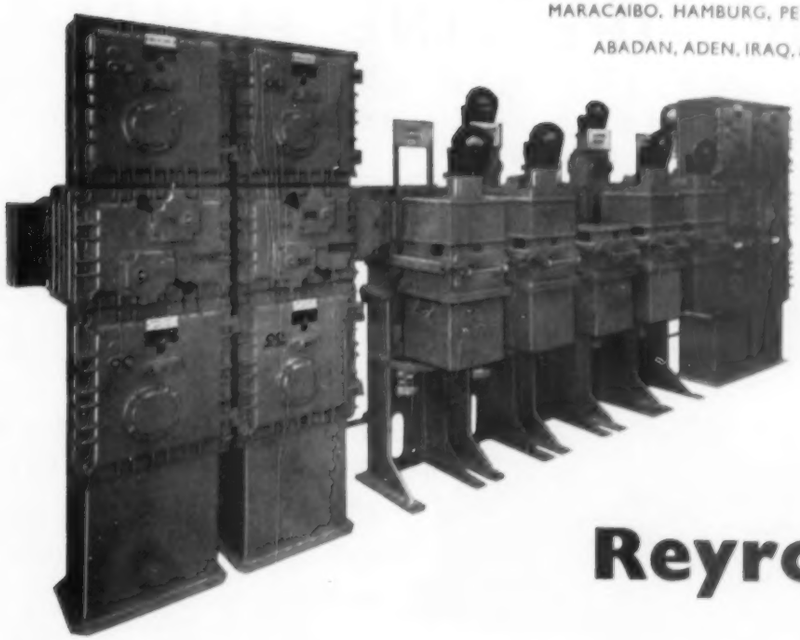

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John Grubb

Cameron Forms International Division

According to an announcement by Herbert Allen, vice president and general manager of Cameron Iron Works, Inc., Houston, John Grubb has been appointed manager of the newly formed international division. This new division is comprised of the present Cameron Iron Works of Canada Ltd., The British Oilfield Equipment Co. Ltd. in England, the Cameron export division in New York City and all other manufacturing and sales offices outside the United States. The further licensing of firms outside the Unted States to manufacture Cameron products will also be handled by the international division.

Mr. Grubb was formerly director and general manager of National Supply Co. of Venezuela.

Ethyl Appoints Kellogg

Hudson W. Kellogg has been appointed manager of the gasoline testing division of Ethyl Corporation to succeed the late J. Clifford Pope. Mr. Kellogg has been assistant manager of gasoline testing since 1946.

New Light Four-wheel Drive

Light Off-Highway Truck

A new four-wheel-drive, light-duty International truck with power and traction to travel cross-country fully loaded in mud, sand or snow has just been introduced by International Harvester export Co. The R-120 (4x4), has a gross vehicle weight rating of 7,000 pounds, and is offered in four wheelbases between 115 and 134 inches.

In proving ground tests, the R-120 (4x4), fully loaded, climbed a 56 per cent grade handily.

To Build Reformer

Continental Oil Co. will build a 1,500-barrel catalytic reforming unit at its Artesia, N. Mexico refinery. Invitations to bid on the $500,000 project are now being sent to contractors.

Dewpoint Indicator

A new, portable, manually-operated dewpoint indicator for easy, convenient measurement of moisture in gases has been announced by General Electric's instruments department, Lynn, Mass. It is designed for applications where only periodic checks of dewpoint are desired.

Ken S. Ramey

Ramey Heads Axelson Sales

Ken S. Ramey has been appointed sales manager for the petroleum equipment division of Axelson Manufacturing Co., Los Angeles. He succeeds J. R. Walker, who continues with Axelson as a consultant on marketing and distribution problems.

Mr. Ramey has been the mid-continent manager for Axelson in Tulsa since 1950. He joined the company in 1923 and became California sales manager in 1943. Prior to that he was with the General Petroleum Corp.

Derby Builds Ultraformer

Derby Refining Co. will expand its Wichita, Kansas refinery by adding a new Ultraforming unit, the first to be built in the State of Kansas. The new unit is part of a $700,000 program. It will have a capacity of 2,500 b/d.

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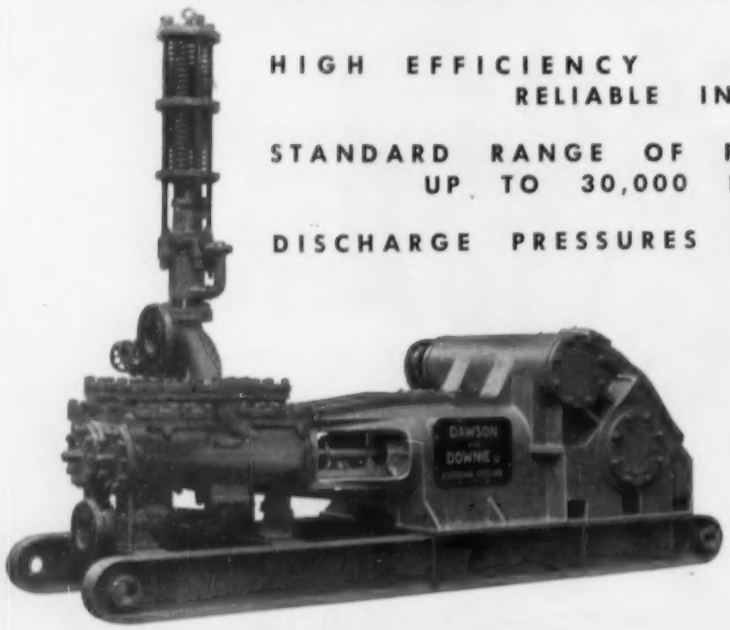

Illustration shows one of a series of pumps supplied to BRITISH PETROLEUM CO. LTD.'S refinery at ADEN, for pumping diesel and fuel oils from the refinery to the B.P. bunkering installation.

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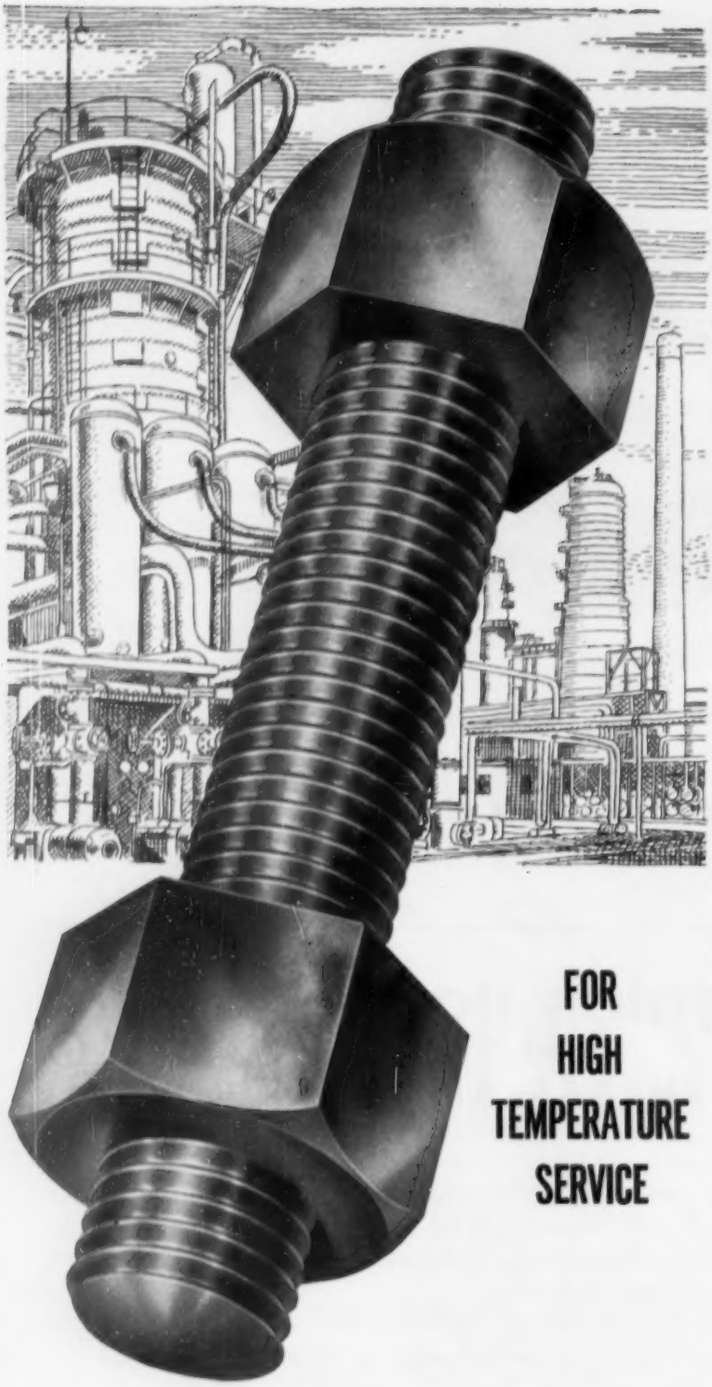

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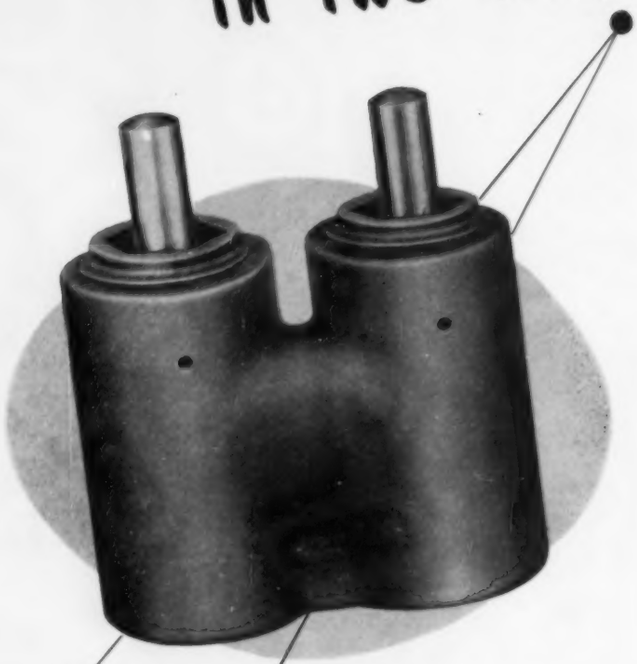

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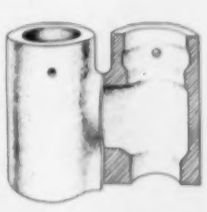

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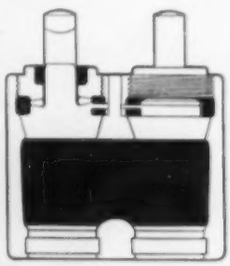

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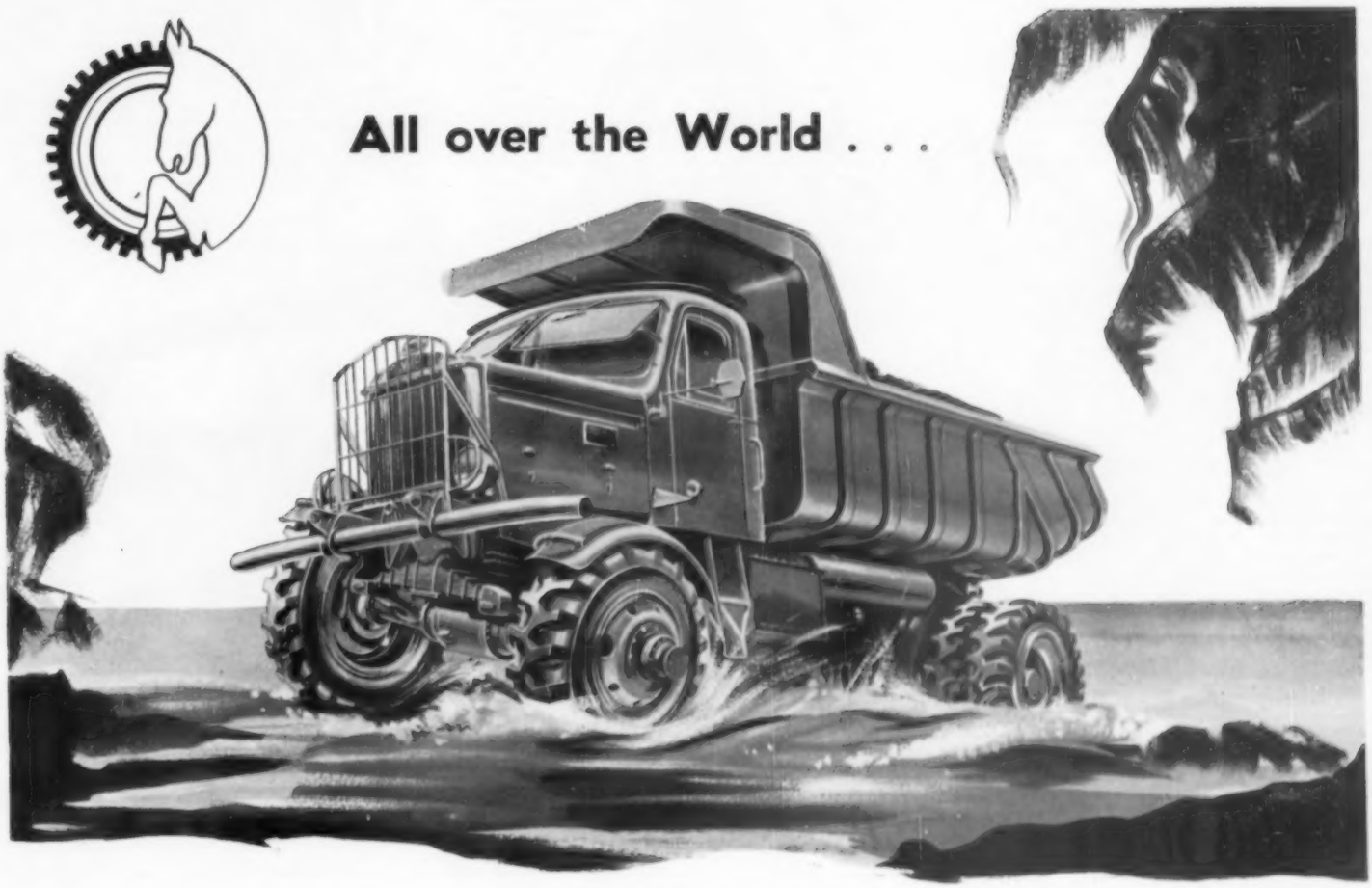

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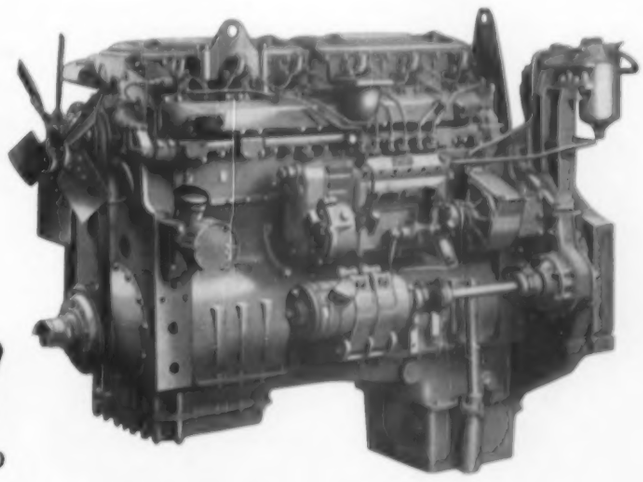

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New Synthetic Rubber

Pilot plant production for a new type of synthetic rubber which promises to replace natural rubber in truck tires has been begun by The Firestone Tire & Rubber Co. Infra-red and X-ray analyses indicate that the new rubber is essentially the same as natural rubber. Road tests showed that the rubber has physical properties at normal and elevated temperatures equivalent to those of natural rubber. For two years Firestone has had a pilot plant in production and more than a half-million miles of tire tests have been completed.

Marketing Expansion

D-X Sunray Oil Co. has launched an expansion of marketing operations since the recent merger. Approximately 200 company-type service stations and bulk plants are scheduled for completion this year. An extensive new marketing drive is being conducted in many new areas where D-X has not previously operated. New district sales offices have been opened in St. Louis, Mo., and Wichita, Kans., and a new district sales office will be opened soon in Memphis, Tenn.

Scintillation Detector

The Cardinal, a new aerial scintillation counting system developed by The Radiac Company, permits reconnaissance at increased altitudes and speeds. Designed for one-man planes the unit has an automatic alarm circuit which signals the pilot whenever an anomaly is passed and enables him to give his full attention to flying. The Cardinal weighs 17 lbs. complete and can be used in a helicopter or other light plane.

Nitroparaffin Plant Building

Commercial Solvents Corp. is building a $5 million petrochemical plant at Sterlington, La., for the production of 10 million pounds per year of nitroparaffins. Four primary products to be produced are nitromethane, nitroethane and 1 and 2 nitropropane. From these some 2,000 derivatives have been produced in the laboratory during a 20-year research period.

Hydrocarbon Properties

Publication of a monograph titled "Some Properties of the Lighter Hydrocarbons, Hydrogen Sulfide, and Carbon Dioxide," has been announced by the American Petroleum Institute. Prepared by B. H. Sage and W. N. Lacey, professors of engineering at the California Institute of Technology, the monograph is a compilation of data resulting from a series of investigations conducted by API Research Project 37 during the period 1947 through 1953.

Copies of the 250-page book may be obtained through the Institute's New York office, 50 West 50th Street, at $6 each for API members, and $10 each for non-members.

Sohio Builds Dry-Ice Plant

Standard Oil Co. of Ohio will build an $800,000 dry-ice plant as the first expansion of its petrochemical plant now under construction at Lima. The unit will produce 75 tons per day of dry-ice or bulk liquid carbon dioxide.

Construction work on the Sohio petrochemical plant is well ahead of schedule. It is expected that the 300-ton anhydrous ammonia unit will be placed in operation during October and the 180-ton nitric acid plant in November. The urea unit will be placed in operation during January and the dry-ice plant next May.

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Ammonia Plant Begun

The M. W. Kellogg Co. has begun initial activities in the construction of a 300-ton-per-day anhydrous ammonia plant for The Standard Oil Co. of California's new multi-million dollar petro-chemical facilities at Richmond, Calif.

A substantial proportion of the 300 tons of anhydrous ammonia produced per day in this new plant will be used in the manufacture of complete fertilizers.

This new synthetic ammonia plant has been designed to employ the M. W. Kellogg process of steam methane reforming, in which natural gas and refinery gas are used as starting materials. With this process the plant will incorporate a number of design innovations. Unique to the process, for example, is the reforming step, which results in 25 to 35 percent savings in compressor horsepower.

A special quench-type reactor which allows optimum temperature control also contributes to improved ammonia yields and lower operating costs of the process. A new isothermal condition is obtained in the reactor, leading to longer catalyst life, lower maintenance costs, and higher conversion per pass.

Named to Texas Butadiene Post

K. D. Bowen of Charlotte, N. C., has been elected vice president and general manager fo the new Texas Butadiene & Chemical Corp. of Houston. Texas Butadiene plans to proceed immediately with the construction of a privately financed multi-million dollar alkylate-avgas and butadiene plant in the Houston area.

Mr. Bowen was with the Dow Chemical for 17 years in various capacities, including manager of the Texas styrene plant. In 1945 he left Dow to join Celanese Corp. of America as manager of its first chemical plant at Bishop, Texas. He became manager of plant operations of the chemical division of Celanese in 1951 and became director of manufacturing coordination in 1953.

Shell Shifts Exploration Executives

Three executive changes in Shell Oil Company's exploration department, all effective July 1, have been announced. Sherwood Buckstaff, manager of the exploration department for the Houston area, has been appointed to the firm's head office exploration department to carry out a special assignment in Houston. Sutton Metz, manager of the Midland, Texas, area exploration department, will replace Mr. Buckstaff as exploration manager in Houston. George Corey, division exploration manager for the Midland area, will be advanced to the post of exploration manager, Midland area.

Sunray Mid-Continent to Build Gasoline Plant

Sunray-Mid-Continent Oil Co. will build and operate a new low temperature absorption type gasoline plant with dehydration facilities to be built near Ingleside, Texas by 13 oil and gas producers.

The Red Fish Bay gas products plant is designed to process 140 million cubic feet of gas per day with 80 percent propane recovery. The total plant production will be approximately 125,000 gallons of LPGas and natural gasoline products per day, of which Sunray's interest will be approximately 30 percent.

Houdry Amends Suit

Houdry Process Corp. has asked the United States District Court at Philadelphia for permission to amend and supplement its 1953 cracking patent infringement suit against Socony Mobil Oil Co. The suit, one of the largest equity actions in the petroleum industry's history, is moving toward the trial stage as both sides near completion of deposition-taking and assembly of documentary evidence and exhibits.

The damages originally asked by Houdry totaled $21,700,000. This is now raised to $52,773,464. Treble damages are asked.

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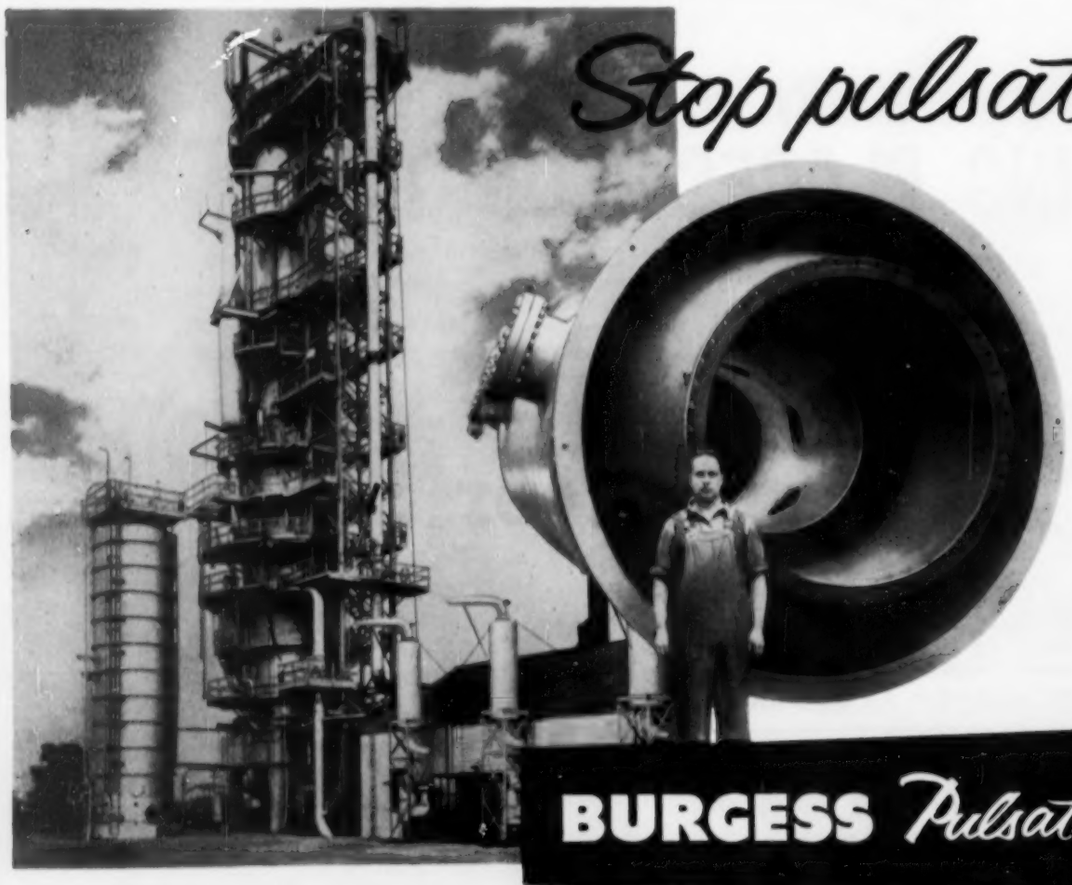
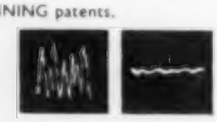


Pipes carrying gas and air under pressure from pumps, blowers, or compressors may fail, or require special reinforcement, as a result of surging and the consequent pulsatory vibration. This problem is overcome by fitting BURGESS Snubbers, which convert intermittent flow to smooth flow—and which, by eliminating a cause of line failure, often effect economies by permitting less costly pipes to be used. BURGESS Snubbers are made to the specifications and design of the original American BURGESS-MANNING patents.



Oscilloscope recording shows pulsation (left) and smooth flow attained after fitting BURGESS Snubber (right).

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—From an address by Eugene Holman, Chairman of the Board, Standard Oil Company (New Jersey)

STANDARD OIL COMPANY (NEW JERSEY)

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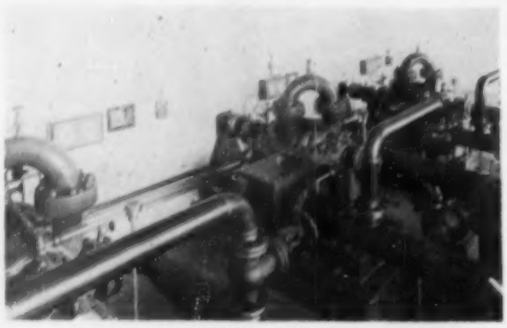
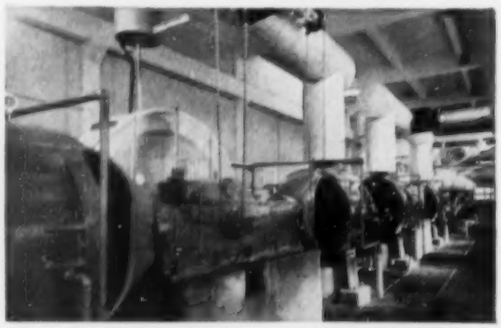


Turbines driving feed water pumps



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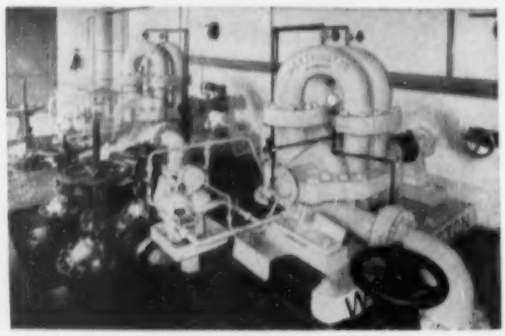

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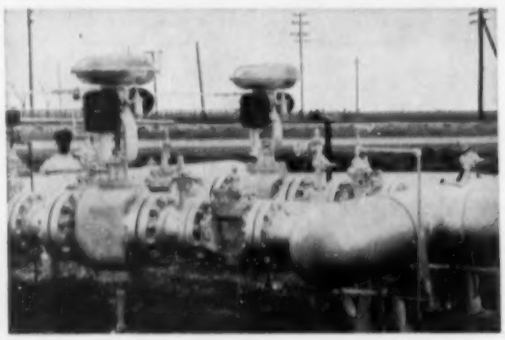

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The **FOX Gas Processing Plant** was designed and constructed by Hudson in collaboration with Signal Oil and Gas Company. The plant design includes features reflecting a combination of the long experience of Signal in the operation of similar plants with the experience of Hudson in designing, constructing and initially operating more than 100 major projects for the oil and gas industry.

When additions now in progress are completed by Hudson, approximately 60 million cubic feet per day of casinghead gas from the Fox and nearby fields of Carter County, Oklahoma, will be processed, and about 3,000 barrels per day of finished products will be recovered from the gas.

Hudson is happy to add Signal Oil and Gas Company to its long list of clients, and particularly proud that through the coordinated efforts of Signal and Hudson this major project was completed in 7 months — from first discussion to smoothly operating plant.

DESIGNERS AND CONSTRUCTORS OF
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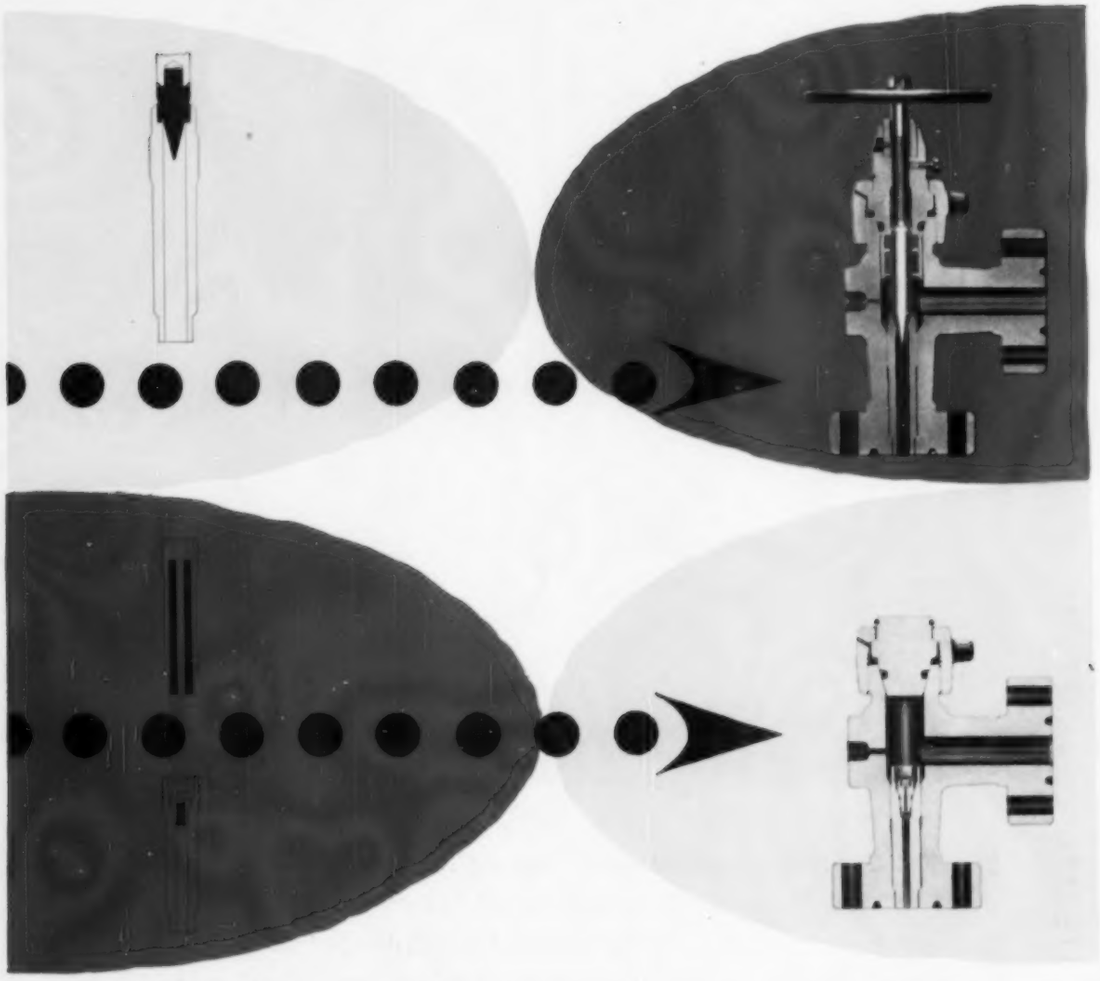

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